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Illinois Waterfowl Surveys and Investigations W-43-R-61

Annual Progress Report

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ANNUAL REPORT – FY2014
Illinois Waterfowl Surveys and Investigations
Federal Aid in Wildlife Restoration
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EXECUTIVE SUMMARY

Objectives

1) Inventory abundance and distribution of waterfowl and other waterbirds during fall migration at specific sites along the Illinois and central Mississippi rivers

2) Investigate the ecology of canvasback and lesser scaup during spring migration in the central Illinois River valley (IRV) and Pool 19 of the Mississippi River

3) Determine the current status (i.e., present or absent) of known great blue heron and great egret colonies and bald eagle nests in Illinois not located during spring 2012 surveys

4) Investigate the breeding ecology of sandhill cranes in northeastern Illinois

5) Distribute our findings to site managers and biologists, make recommendations for future management, and draw conclusions relevant to regional conservation planning

Methods

We scheduled 17 flights of the Illinois and Mississippi rivers from early September 2013 to early January 2014 during which we inventoried 16–23 areas in each river valley. One observer conducted all inventories from a single-engine, fixed-wing aircraft flying at an altitude of <450 ft and 150–160 mph (Havera 1999). We computed waterfowl use-day (Stafford et al. 2007) and peak abundance estimates for the Illinois River valley (IRV) and central Mississippi River valley (CMRV) and made comparisons between the current waterfowl abundance and the most recent 5-year average.

We investigated behavior, food abundance, foraging site selection, and distribution of lesser scaup and canvasbacks in the IRV and Pool 19 of the Mississippi River during spring 2014 to provide data critical to effectively allocating conservation efforts and to help guide habitat restoration and conservation planning at state and regional levels. We aerially estimated diving duck and merganser abundance by species along the IRV and Pool 19 five times using inventory-style aerial surveys (Havera 1999). Additionally, we completed 5 aerial line transect surveys of Pool 19 during spring. We used Program DISTANCE to generate detection probabilities and populations sizes by species and survey date for comparison to concurrent inventory estimates (Buckland et.al. 2001). We visited concentrations of lesser scaup and canvasbacks, identified by aerial surveys and located incidentally, and quantified behavior using scan surveys and food abundances using standard core and sweep sample collection and processing methods at feeding and random locations (Anteau and Afton 2008, Hagy et al. 2012). We experimentally collected lesser scaup (*Aythya affinis*) and canvasbacks (*Aythya valisineria*) and analyzed blood metabolites to infer daily lipid dynamics and foraging habitat quality. Additionally, we captured and banded diving ducks and estimated apparent stopover duration. Herein, we describe the results from year three (2014) of a four-year study.

We aerially searched 555 waypoints of known wading bird colonies (i.e., great blue heron [*Ardea herodias*] and great egret [*Ardea alba*]) and bald eagle (*Haliaeetus leucocephalus*) nests in Illinois during March 2014. We grouped waypoints representing eagle and wading bird nests into four flight plans that encompassed the entire state. We marked new nests and colonies, those incidentally encountered but not in the current database, with a new waypoint and recorded pertinent data.

Major Accomplishments and Findings

Three of four scheduled flights were completed in September to document the distribution of early-migrating blue-winged and American green-winged teal (scientific names presented in Table 1). We were unable to complete a flight during the week of September 16–20 due to unfavorable weather. We completed all 16 flights of the Illinois River and 13 flights of the Mississippi River. Peak abundance of total ducks was greater in both the IRV and CMRV in 2013 than 2012. In the IRV, peak abundance of total ducks for 2013 occurred on November 8, 2013 (876,255) and was the highest estimate since 1979. Peak abundance of total ducks in the CMRV occurred on November 29th (709,375) and was the highest estimate since 1985. Total duck use-day estimates were elevated along both rivers during fall 2013 and were the highest recorded since 1985 in the IRV and 1981 in the CMRV.

We provided weekly summaries of waterbird abundance to the IDNR Waterfowl Program and other parties of interest and posted aerial survey data on the Forbes Biological Station web page (www.bellrose.org). Additionally, we posted an aerial inventory blog on the Forbes Biological Station web page and the Forbes Biological Station Facebook page (www.facebook.com/forbesbiologicalstation) which was viewed extensively by the public. Data was distributed for the Mallard Migration Observation Network and used to help prepare the Illinois Waterfowl Hunting Season report for the Mississippi Flyway Technical Section and Council. These data are currently being prepared for a feature article in the journal *Meadowlark*.

During spring 2014, peak numbers of diving ducks and mergansers were observed on March 17, 2014 in both river systems shortly after spring ice-out. Total diving duck abundance declined (7–28%) from 2013 peaks in the IRV and on Pool 19. Total use days along the IRV were similar (+ 6%) to estimates from 2013; however, use-day estimates from Pool 19 were markedly lower (-52%) in spring 2014. Inclement weather prevented aerial inventories of the IRV and Pool 19 for two weeks in late March and early April, 2014, and may have negatively influenced our measures of diving duck abundance during spring 2014. We successfully completed transect surveys on Pool 19 during springs 2013 and 2014, but found that the parallel transects conducted in 2014 produced more reasonable population estimates and were logistically much more feasible. Perpendicular transects conducted in spring 2013 produced estimates that were highly variable, unrealistically low, and drastically different from other concurrent survey estimates. Moreover, parallel transect surveys produced estimates similar to aerial inventories at moderate population abundances.

Overall, diving ducks spent the majority of their time foraging, resting, or in motion. Lesser scaup in the IRV spent less time feeding ($\bar{x}$ = 38.5%) and more time resting ($\bar{x}$ = 23.0%) than scaup at Pool 19, which foraged more ($\bar{x}$ = 40.3%) and rested less ($\bar{x}$ = 18.7%). Lesser

scaup spent a significant proportion of time in motion in both the IRV ($\bar{x}$ = 31.9%) and Pool 19 ($\bar{x}$ = 29.7%). Overall, canvasback time foraging ($\bar{x}$ = 39.7%) was similar to lesser scaup, but canvasbacks rested a greater proportion of time ($\bar{x}$ = 33.0%) and spent less time in motion ($\bar{x}$ = 16.9%). Canvasbacks fed less ($\bar{x}$ = 36.3%) and rested more ($\bar{x}$ = 35.8%) in the IRV than those observed at Pool 19 (feeding, $\bar{x}$ = 66.4%; resting, $\bar{x}$ = 11.2%), but our number of canvasback observations was considerably less at Pool 19 (n = 259) than in the IRV (n = 2,020).

Across all IRV lakes and segments of Pool 19, seeds and tubers, nektonic invertebrates, and benthic invertebrates totaled 262.7 kg/ha (234.4 lbs/ac). Combined food totals for Pool 19 were 977.0 kg/ha (871.7 lbs/ac), but 96.9% of that estimate was benthic invertebrates. In the IRV, 203.2 kg/ha (181.3 lbs/ac) of combined food was potentially available to diving ducks, with seeds and tubers comprising 84.3% of that estimate. In locations where lesser scaup and canvasbacks were observed for behaviors, lesser scaup tended to forage in areas with greater seed and tuber abundances ($\bar{x}$ = 261.0 kg/ha; 232.6 lbs/ac) in the IRV, but foraging sites at Pool 19 contained negligible additional biomass than random sites ($\bar{x}$ = 6.0 kg/ha; 5.4 lbs/ac). Overall, Pool 19 contained far greater biomass of benthic invertebrates at random sites (947.1 kg/ha; 845.0 lbs/ac) than did the IRV (30.8 kg/ha; 27.5 lbs/ac) compared to foraging sites. Lesser scaup tended to forage in areas with more benthic invertebrate biomass than random sites in the IRV ($\bar{x}$ = 68.7 kg/ha; 61.3 lbs/ac) but in areas with less at Pool 19 ($\bar{x}$ = -856.5 kg/ha; -764.2 lbs/ac). Overall, diving ducks foraged in locations containing 0.7 kg/ha (0.6 lbs/ac) more nektonic biomass than random sites, but nektonic invertebrate biomass was relatively low overall in both regions. At locations where foraging birds were experimentally collected, seed and invertebrate biomass tended to be similar or no pattern in site selection was readily apparent. Biomass at random and feeding locations was similar in the IRV and there was a slight tendency for scaup to feed in locations that contained less food biomass than random locations. Overall, we found little evidence to suggest that lesser scaup were selecting foraging locations with greater food densities than random locations.

We collected 153 lesser scaup and 21 canvasbacks in the IRV and Pool 19 and analyzed diets of 42 and 11, respectively, which were observed foraging, had sufficient food in the esophagus for inference, and which samples were processed at the time of this report. Generally, plant material was observed more frequently and at a greater percent aggregate mass than invertebrates or other food items. Lesser scaup diet frequently (91% of birds) contained invertebrates, but overall aggregate percent biomass (39%) was less than plant material (61%). Notable food items included chironomids, sphaerid clams, redroot flatsedge, barnyardgrass, Walter's millet, and nodding smartweed (scientific names given subsequently). Canvasbacks also consumed principally plant matter, with barnyardgrass, plant tubers, yellow nutsedge, and long-leaf pondweed as the most common taxa. In these collected birds, mean daily lipid dynamics (DLD) of diving ducks appeared to vary by region. Diving ducks collected in the central IRV had a positive index of DLD, while birds collected near the Illinois and Mississippi River confluence and at Pool 19 of the Mississippi River had a negative mean DLD. Coarsely, DLD values and seed densities were greater in the central IRV than the Illinois and Mississippi River confluence or Pool 19, but the relationship between DLD and overall seed density was inconsistent among wetlands.

We banded 2,488 lesser scaup and 3 canvasbacks in spring 2014 during 26 trap nights. Overall, approximately 85% of banded lesser scaup were male, and 100% of captured canvasbacks were male. Apparent stopover duration of recaptured lesser scaup was 7.3 days, with females stopping over approximately 1 day less than males.

We identified 263 active eagle nests and 126 active wading bird colonies in Illinois and along the shoreline of the Mississippi, Wabash, and Ohio rivers bordering Illinois. Wading bird colonies in Illinois increased 37% when compared with known colonies in 2001; however, nest density in active colonies has declined. We documented 82.3 nests in active colonies (multiple species) over the 2-year period. Great blue heron nests in active colonies declined 37% from 129.4 nests (2001) to 81.3 nests (2012). In contrast, the number of known active eagle nests (n = 263) in Illinois has tripled in the last decade. Further investigations of wading bird colonies in Illinois are prudent.

Estimated annual adult survival was comparable for both breeding and non-breeding cranes marked in 2012 and 2013 ($\bar{x}$ = 96%, SE = 3.77%; $\bar{x}$ = 97%, SE = 2.74%, respectively). However, our data revealed lower than expected survival of juvenile birds (i.e., post-fledging to one year old; $\bar{x}$ = 43%, SE = 7.70%). Furthermore, average breeding productivity (i.e., the probability of a breeding pair successfully fledging young) was 16% (SE = 3.05%). Although these are preliminary data, low juvenile survival and high rates of colt morality in urban landscapes may have significant implications for future management as harvest strategies develop and urban sprawl continues to modify breeding areas.

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NARRATIVE

STUDY 114: AERIAL INVENTORIES OF WATERFOWL IN ILLINOIS

Job 114.1: Inventory waterfowl along the Illinois and central Mississippi rivers during fall and winter.

Objectives:
1) Inventory waterfowl and American coots along the Illinois and central Mississippi rivers during fall migration using light aircraft.
2) Compute use days and peak abundances for observed species.
3) Provide general inference regarding the distribution of waterfowl in space and time.
4) Compare these data to recent and long-term averages.
5) Summarize and distribute these data.

Introduction

The Illinois and Mississippi river valleys are major migration and wintering areas for nearly 30 species of waterfowl in the Mississippi Flyway. Additionally, these regions provide significant recreational opportunities (e.g., hunting and bird watching). Data from aerial inventories are used to direct waterfowl management, habitat acquisition, ecological research, and for public outreach. There are many important private, state, and federal waterfowl areas and refuges within these river floodplains, such as the Mark Twain National Wildlife Refuge (NWR), the Illinois River National Wildlife and Fish Refuges, and Keokuk Pool. The Illinois Natural History Survey (INHS), with support from the Illinois Department of Natural Resources (IDNR) and the Federal Aid to Wildlife Restoration Fund through the U.S. Fish and Wildlife Service (USFWS), has conducted aerial inventories of waterfowl along the Illinois and Mississippi rivers since 1948 (flown each year but 2001). This undertaking represents the longest known inventory of waterfowl, preceding even the USFWS breeding waterfowl counts and mid-winter inventories established in 1955. Therefore, 65 years of data exist on fall-migrating waterfowl for these critical ecoregions, collected by only 4 observers.

Aerial inventory results are frequently requested and circulated among federal and state personnel. Specifically, the IDNR relies on these inventories to guide the establishment of hunting season dates, zones, and other regulations and to prioritize wetland habitat acquisitions.

Previously, this database has been used by the Mississippi Flyway Technical Section and Council to monitor abundance and distribution of migrating waterfowl, especially canvasbacks, mallards, and northern pintails. Requests for inventory information are received annually from state, federal, and private-sector employees to be used for projects such as Environmental Management Programs, scientific publications, theses and dissertations, formal presentations, and newspaper and magazine articles. Further, the long-term nature of this dataset makes it particularly unique and valuable; therefore, it was essential that the fall inventory database continue to be summarized and maintained for future analyses. For these reasons it was necessary and prudent to monitor waterfowl in Illinois to maintain this long-term dataset, evaluate spatial and temporal variation in abundance and distribution of waterfowl, and present these data concisely to aid waterfowl and wetland management decisions in this region.

Methods

The INHS began aerial inventories of waterfowl during fall migration in the Illinois and Mississippi river floodplains in 1948. Initially, these flights were conducted weekly from October to mid-December, and the winter inventory in early January was added in 1955. More recently, INHS flights were conducted from early September through early January. We used fixed-wing aircraft to conduct aerial inventories of waterfowl present at selected sites along the Illinois (Hennepin to Grafton, IL) and central Mississippi river valleys (Grafton to near New Boston, IL) during fall and early winter (Fig. 1; Havera 1999). One observer conducted all inventories from a single-engine, fixed-wing aircraft flying at an altitude of <450 ft and 150–160 mph (Havera 1999, Stafford et al. 2007).

We recorded the number and species composition of waterfowl at each site, and survey methods mirrored previous years to maintain consistency with past inventories (Havera 1999). During each flight, we inventoried 16–23 areas in each river valley that typically host the majority of waterfowl in the region (Horath and Havera 2002). We computed waterfowl use-day (Stafford et al. 2007) and peak abundance estimates for the Illinois River valley (IRV) and central Mississippi River valley (CMRV) and made comparisons between the current waterfowl abundance and the most recent 5-year average. We also noted river water levels and resulting foraging habitat quality for waterfowl during September flights (Fig. 2).

Results

We provided weekly summaries of waterbird abundance to the IDNR Waterfowl Program as well as other parties of interest (Appendix 1). We posted aerial survey data weekly on the Forbes Biological Station web page (www.bellrose.org) for public outreach to the waterfowl hunting and bird watching communities. Additionally, INHS observer, Aaron Yetter, reported observations of waterfowl and habitat conditions following each flight in a blog that was posted weekly on the Forbes Biological Station web page and on social media (www.facebook.com/forbesbiologicalstation). Between September and December 2013, the aerial inventory blog reached over 18,000 Facebook users. Aerial survey data was also used by the Mallard Migration Observation Network to generate the Mallard Migration Status map posted online by Missouri Department of Conservation (http://mdc.mo.gov/hunting-trapping/waterfowl-hunting/waterfowl-reports/mallard-migration). This information was also used to help prepare the Illinois Waterfowl Hunting Season report that is presented to the Mississippi Flyway Technical Section and Council at their annual winter meeting. We also summarized aerial inventory data for a feature article in the *Meadowlark*, a journal of the Illinois Ornithological Society.

Waterfowl Abundance

Peak abundance of total ducks was greater in both the IRV and CMRV in 2013 than 2012 (Table 2, Appendix 1). In the IRV, peak abundance of total ducks for 2013 occurred on 8 November (876,255; Fig. 3); this estimate was 42% greater than the 2012 peak (617,565) and 169% above the most recent 5-year average of 325,383 (2008–2012; hereafter, 5-year average). Total duck abundance peaked on 29 November in the CMRV at 709,375 (34% greater than 2012 [531,040]; 75% above the 5-year average [405,614]; Fig. 4). The peak abundance estimate of total ducks for the two river systems combined (1,197,865) occurred on 19 November and was 4% greater than in 2012 (1,148,605) and 68% above the 5-year average (712,873).

In the IRV, peak abundance estimates for mallard (329,590), American black duck (1,505), and blue-winged teal (24,455) were less in 2013 than 2012, whereas estimates for northern pintail (141,840), American green-winged teal (179,620), American wigeon (14,160), gadwall (146,300), and northern shoveler (49,060) were greater in 2013 than 2012. Several of these peak abundances (i.e., northern pintail, American green-winged teal, gadwall, and northern shoveler) were the greatest recorded since the survey began in 1948. The peak abundance of

total dabbling ducks (757,405) was 30% greater than the 2012 estimate (583,370) and 154% above the 5-year average (298,250).

In the CMRV, 2013 peak abundance estimates for American black duck (625) and blue-winged teal (4,920) were less than in 2012. Peak estimates for all other dabbling duck species in the CMRV were greater in 2013 than 2012 (mallard [374,120], northern pintail [98,950], American green-winged teal [79,120], American wigeon [3,350], gadwall [79,970], and northern shoveler [21,545]). Similar to the IRV, peak estimates for three dabbling duck species in the CMRV were the highest ever recorded (i.e., American green-winged teal, gadwall, and northern shoveler). Peak abundance of all dabbling duck species in the CMRV was 17% greater in 2013 (498,030) than 2012 (424,905) and 57% above the 5-year average (316,938).

Diving duck abundance in the IRV peaked on 8 November in 2013 at 118,830 (146% greater than 2012 [48,285]; 258% above the 5-year average [33,148]). Peak abundance estimates for lesser scaup (1,530), common goldeneye (1,255), and bufflehead (660) were less in 2013 than 2012, whereas estimates for ring-necked duck (88,610), canvasback (6,635), and ruddy duck (34,920 [highest ever recorded]) were greater in 2013 than 2012.

In the CMRV, diving duck abundance peaked on 29 November in 2013 at 296,655 (65% greater than 2012 [179,585]; 161% greater than the 5-year average [113,861]). Peak abundance estimates for lesser scaup (38,200), redhead (10), ruddy duck (15,465), and common goldeneye (11,620) were less in 2013 than 2012, whereas estimates for ring-necked duck (34,200), canvasback (261,550 [highest ever recorded]), and bufflehead (6,410) were greater in 2013 than 2012.

Waterfowl Use Days

Use-day estimates for total ducks were greater in the IRV and CMRV in 2013 than 2012 (29,681,598 [+36%] and 25,004,493 [+31%], respectively; Table 3), despite an earlier ice-up in 2013. These use-day estimates were the highest recorded since 1985 in the IRV and 1987 in the CMRV (Fig. 5). In the IRV, excepting American black duck, estimated use days for all dabbling duck species were greater in 2013 than 2012. In the CMRV, excepting blue-winged teal and northern shoveler, estimated use days for all dabbling duck species were greater in 2013 than 2012.

Total diving duck use-day estimates in the IRV were 20% greater in 2013 than 2012 (2,333,978 and 1,949,923, respectively). With the exception of ring-necked duck, canvasback, and redhead, use-day estimates for the 4 remaining diving duck species were less in the IRV in

2013 than 2012. In the CMRV, with the exception of canvasback and bufflehead, estimated use days for all diving duck species were less in 2013 than 2012. Total diving duck use days in the CMRV increased by 42% from 2013 to 2012 (5,823,610 and 4,113,903, respectively).

Discussion

Abundant spring rains caused excessive flooding in the IRV and record water elevations at Henry (32.87 ft.; April 22, 2013) and Havana (27.78 ft.; April 25, 2013), IL. As a result, high-water levels persisted well into the growing season (Fig. 2; U.S. Army Corps of Engineers, unpublished data). Water levels slowly dropped to low summer elevations by mid-July and remained relatively low for the rest of the growing season. A similar flood pulse was observed along the CMRV during summer 2013. Wetland managers practicing moist-soil management in the river floodplains were allowed a late-season drawdown. As a result, wetland habitat conditions for waterfowl at the onset of fall migration were highly variable but, overall, moist-soil vegetation ranked average for both rivers. A few areas supported abundant submersed aquatic vegetation (SAV); however, beds of SAV at Pool 19 were considered below average. Indeed, some waterfowl hunting areas and refuges had excellent waterfowl foraging habitat; notables in the IRV included Cuba Island, Carlson Unit at Anderson Lake, Emiquon Preserve, Chautauqua Lake, Hitchcock Slough, Swan Lake, and Hennepin & Hopper lakes. Similarly, a few areas along the Mississippi River had above average duck forage including Delair, Ted Shanks, Cannon, Batchtown, and Dardenne refuges. However, many refuge managers along both rivers did not drawdown or only partially dewatered due to high river levels persisting until early summer.

Inclement weather in the north-central U.S. and Canada forced staging waterfowl out of the prairies in late-October and early-November. Peak abundance of total ducks was greater in both the IRV and CMRV in 2013 than 2012. In the IRV, peak abundance of total ducks for 2013 occurred on 8 November (876,255). Peak counts of waterfowl in the IRV were the greatest since 1979 and occurred more than a month earlier than 2012 (12 December) but at a similar time to 2011 (15 November). Peak numbers of American green-winged teal, gadwall, and northern shoveler were the highest ever recorded for each of these species since the survey began in 1948. Many IRV wetlands were frozen by 27 November and duck abundances remained below the weekly long-term averages for the remaining waterfowl surveys (Appendix 1).

Similar to the IRV, ducks were very abundant and peaked in the CMRV on 29 November (708,025). Comparable duck abundances haven't been recorded in the CMRV since 1985. The 2013 peak abundance of total ducks was 2 weeks earlier than fall 2012 (12 December; 531,040) but chronologically comparable to fall 2011 (30 November). Peak numbers (261,550) of canvasback on Pool 19 of the Mississippi River were observed ≥1 month (29 November) earlier than in falls 2011 and 2012 and were 89% above the peak in 2012 and 261% above the 5-year average. Similar to the IRV, wetlands froze in late November and waterfowl numbers remained at or below weekly long-term averages for the remaining surveys (Appendix 1).

The early immigration of a large number of ducks into Illinois in late October drastically elevated duck numbers in both river systems. Mild weather prevailed during November and freeze-up did not occur until late November along both rivers, which likely prolonged stopover duration in many species. Correspondingly, total duck use days in the IRV and CMRV were up 36% and 31% from 2012 and were 105% and 80% above the 5-year average. The total duck use days encountered in fall 2013 have not been documented for nearly 3 decades (mid-1980's).

STUDY 115: ECOLOGY OF SPRING-MIGRATING CANVASBACKS AND LESSER SCAUP IN THE CENTRAL ILLINOIS AND MISSISSIPPI RIVER VALLEYS

Job 115.1: Ecology of spring-migrating canvasbacks and lesser scaup in Illinois.

Objectives:
1) Aerially estimate abundance of lesser scaup and canvasbacks during spring migration in the Illinois River and Pool 19 of the Mississippi River of Illinois.
2) Document distribution of lesser scaup and canvasbacks among and within wetlands of both river systems.
3) Evaluate spring habitat composition and quality (e.g., forage abundance) within wetlands where concentrations of lesser scaup and canvasbacks occur (i.e., as determined by Objective 2).
4) Investigate and quantify behavior of lesser scaup and canvasbacks to estimate the functional response of these species to variation in habitat.
5) Experimentally collect up to 250 lesser scaup to assess diets and blood metabolites (i.e., in conjunction with Objectives 3–4).
6) Leg-band up to 1,000 lesser scaup and 500 canvasbacks along the Illinois River.

Introduction

Millions of waterbirds rely on Illinois wetlands during fall and spring migration. Historically, diving ducks were abundant during both seasons. For example, 710,275 lesser scaup were recorded on the upper Illinois River on 20 November 1949. However, fall abundance of diving ducks in the Illinois River valley (IRV) declined precipitously in the 1950s and has not recovered; peak abundance of lesser scaup during falls 1993–1996 averaged only 4,465 (Havera 1999). The central Mississippi River, specifically Pool 19, is also a critical area for migrating diving ducks, but peak abundances during fall have declined in this region from about 480,000 during 1978–1982 to 51,300 during 1993–1996 (Havera 1999).

Interestingly, diving ducks are more abundant in these systems during spring than fall. For example, INHS personnel counted nearly 12,500 lesser scaup at Emiquon Preserve in the IRV on 10 March 2007 and 350,000 lesser scaup and 20,000 canvasbacks on Pool 19 of the Mississippi River on 24 March 2008. Thus, wetlands of both rivers systems appear to provide important stopover habitats during spring, a critically important time in the annual cycle of waterfowl. Because diving ducks rely on nutrients acquired during spring migration for breeding, the quality of wetlands in Illinois likely

influences population dynamics of these species (Anteau and Afton 2004).

Lesser scaup and canvasbacks are two diving ducks considered in greatest need of conservation under the Illinois Wildlife Action Plan. Continental populations of both species have decreased significantly over the last 30–40 years, although lesser scaup breeding populations seem to have recently stabilized. The canvasback population reached a low of 373,000 in 1978 and concern remains over the future status of this species. Similarly, the continental breeding population of scaup was estimated at 8.0 million in 1972, but only 3.2 million in 2006. The "Spring Condition Hypothesis" may explain the lesser scaup decline, which indicates that foraging habitats in the midcontinent have declined in quality (e.g., abundance of food; Anteau and Afton 2004). If inadequate forage exists for lesser scaup during spring, these birds may delay, forgo, or risk reduced reproductive potential during the breeding season.

Both species are relatively abundant in Illinois during spring, but the contribution of the state's wetlands to reproduction and population ecology is largely unknown. Detailed information on spring abundance, distribution, habitat associations, and behavior are lacking or antiquated. Therefore, we investigated these factors to provide data critical to effectively allocating conservation efforts and help guide habitat restoration and conservation planning at state and regional levels.

Methods

Aerial Surveys

We aerially estimated diving duck abundance within the IRV during 4 inventories conducted on March 17 and April 8 & 9 (above Pekin, IL on April 8, below Pekin, IL on April 9), and April 15 and 23, 2014. We flew 5 inventories of Pool 19 of the Mississippi River on March 17 and April 7, 9, 15, and 21, 2014 (Fig. 6; Appendix 2). Inventories included bottomland lakes and wetlands along the Illinois River (Hennepin to Meredosia, IL) and Pool 19 of the Mississippi River following spring ice-out and upon arrival of early migrant diving ducks (Havera 1999:187). We documented diving ducks and mergansers by species and abundance. One observer conducted all inventories from a single-engine, fixed-wing aircraft flying at an altitude of <450 ft and 150–160 mph (Havera 1999). We used aerial inventory data of lesser scaup and canvasbacks to identify focal areas to satisfy Objectives 2–4.

Additionally, we completed 5 aerial line transect surveys of Pool 19 during spring. In spring 2013, we orientated 140 transects perpendicular to the river, but results were inconsistent and this approach was logistically difficult for observers. Thus, in spring 2014, we oriented 6 transects parallel

to the river in two different survey strata: 1) Pool 19 dam near Keokuk, IA northward to the bridge connecting Fort Madison, IA to Niota, IL (Dam) and 2) the Fort Madison bridge to the Pool 18 dam near Burlington, IL (Burlington; Fig. 7). We choose stratum boundaries based on logistical aerial survey considerations, habitat similarity, historical bird distributions, and results from 2013 transect surveys. We placed the first and second transects along the east and west shorelines of Pool 19 in the dam stratum. We placed the third and fourth transects along the centerline of the pool 19 dam stratum. Transects 5 and 6 were placed along the east and west shorelines of the Burlington stratum. Aerial observers covered half of the transect area during each trip along each transect due to decreased visibility from the left side of the plane. An aerial observer identified clusters of birds, estimated species composition, and used markings on the window and wing of the airplane to assign clusters into one of five distance intervals along one side of each transect (i.e., 50-m intervals from 70–320 m). We used Program DISTANCE to generate detection probabilities and population sizes by species and survey date (Buckland et.al. 2001). Parameter estimates were derived from the robust model with the greatest Akaike's Information Criteria adjusted for small samples size (Shirkey 2012). Following transect surveys of all strata, we resampled the complete area of Pool 19 using an inventory-style survey (Havera 1999) for comparison with transect survey data.

Behavior and Food Sampling

We visited concentrations of lesser scaup and canvasbacks, identified by aerial surveys and located incidentally, and quantified behavior and food abundances at feeding and random locations. We used modified scan sampling whereby we located individual flocks (i.e., aggregations of ≥50 individuals) of lesser scaup and canvasbacks and quantified instantaneous behavior, species, and sex using 5–10 individual scans of each flock with a 5-minute waiting period between scans. Following scan surveys, we collected vertical sweep-net, Anteau sweep-net (Anteau and Afton 2008a), and benthic-core samples (Hagy et al. 2012*b*) from foraging locations of ducks and random locations within study wetlands. Anteau sweeps consisted of a bottom sweep (i.e., skimming the bottom for a distance equal to the water depth) and an upward sweep through the water column (Anteau and Afton 2008a) while vertical sweep net samples consisted of only a vertical sweep through the water column. All seeds, tubers, and invertebrates were removed from samples or subsamples by hand, dried at 60ºC, weighed by taxon, and extrapolated to kg(dry)/ha using standard protocols and correcting for diet and processing bias (Hagy et al. 2011, Hagy and Kaminski 2012*a*).

Diet and Metabolite Sampling

We experimentally collected lesser scaup, primarily female, from foraging flocks as identified by concurrent aerial and ground surveys. We obtained blood samples and upper digestive tracts (i.e., proventriculous and esophagus) from lesser scaup to measure blood-plasma metabolites (i.e., triglyceride [TRIG], β-hydroxybutyrate [BOHB], and possibly non-esterified fatty acid [NEFA]) and evaluate food use and selection (Anteau and Afton 2008b, 2011). We attempted to collect birds that had been made multiple foraging dives to increase the likelihood of finding food in the digestive tract. We harvested ducks with a shotgun from shore or sneak boats, quickly collected, necropsied, and obtained tissues or other materials preserved on ice until they could be frozen. Later in a laboratory, the proventriculous and esophagus were thawed and all food items identified, enumerated, dried for ≤24 hr at approximately 60°C and weighed. Immediately after collection, we used a cardiac puncture technique to obtain approximately 1 mL of blood for metabolite assays (Anteau and Afton 2008c, 2011). We used a predictive equation developed by Anteau and Afton (2008b) to infer daily lipid dynamics, an estimate of the rate and direction of recent lipid change.

Banding

We captured and banded lesser scaup and canvasbacks along the Illinois River using baited swim-in traps with captures occurring from March through April (Anteau and Afton 2008*b,c*, Yetter et al. 2012). For each bird captured, we recorded species and sex, obtained morphological measurements, and attached an incoloy leg band. Moreover, we monitored recaptures using swim-in traps to coarsely estimate apparent stopover duration in the Illinois River valley.

Results

Aerial Inventory Surveys

During spring 2014, we counted 935,780 diving ducks and mergansers during aerial inventories, which was down 57% from the 2,184,795 diving ducks and mergansers observed in spring 2013 (Appendix B). Peak numbers of diving ducks and mergansers were observed on March 17, 2014 in both river systems shortly after spring ice-out; however, total diving duck abundance declined slightly (7%) from 2013 peaks in the IRV and declined 28% from peaks on Pool 19 compared to spring 2013 (Table 4). In particular, peak abundances of lesser scaup increased in 2014 in the IRV by more than 27,065 ducks over spring 2013; however, ring-necked ducks and ruddy ducks declined sharply when compared with 2013 peak numbers (Table 4). Notably, Emiquon National Wildlife Refuge and

Emiquon Preserve combined accounted for 11.9% and Spunky Bottoms (i.e., Merwin Preserve) hosted 7.2% of the total diving duck use days in the IRV (Table 5). Nearly 71% of the diving duck and merganser use days estimated from Pool 19 were observed below Fort Madison, IA. Riverine habitats of Pool 19 above Fort Madison to Burlington, IA supported far fewer ducks during spring (Table 6). Total use days along the IRV were similar (+ 6%) to estimates observed during 2013; however, use-day estimates from Pool 19 were drastically lower (-52%) in spring 2014 compared with 2013 (Tables 5, 6). In the IRV, scaup and ring-necked ducks accounted for 73% of use days, while scaup and canvasback accounted for 93% of use days on Pool 19. Inclement weather prevented aerial inventories of the IRV and Pool 19 for two weeks in late March and early April, 2014. Ground observations during this period by biologists in the field indicated diving duck numbers peaked and subsequently declined before inventories resumed on 7–9 April; hence, lower peak abundances and use days of diving ducks during spring 2014 when compared with 2013 were likely an artifact of these missed flights and not necessarily an indicator of habitat quality in the IRV or Pool 19.

Aerial Transect Surveys

Overall, estimates of total diving duck density were greater in transect surveys than inventories ($\bar{x}$ = 43%, CV = 117%) and densities ranged from 10.7 ducks/ha during our first survey to 0.06 ducks/ha during our last survey (Table 7). For species that were relatively uncommon or observed at relatively low densities (e.g., redhead, common goldeneye, and ring-necked duck), transect surveys tended to underestimate population size. Conversely, for common and abundant species (e.g., lesser scaup and ruddy duck) aerial inventories tended to underestimate population size. We noted that inventories and transect surveys produced similar estimates of population size for most species when abundances were 10,000 – 150,000, but that differences were common and more pronounced when inventory abundances were outside of this range. Detection probability exceeded 50% in all surveys with coefficients of variation <13% (Table 8). Detection probability increased and variance decreased with greater population size and number of detections.

Behavior and Food Sampling

We sampled behavior from 24 scaup and 7 canvasback flocks totaling 12,897 observations of individual ducks from 5 March to 7 April 2014. We sampled scaup at 13 sites in the IRV and 3 different stretches of Pool 19 of the Mississippi River (Table 9). Canvasbacks were observed from 5 sites in the IRV and from 1 stretch of Pool 19 (Table 10). Extensive ice coverage and rapid warming during spring hindered our ability to observe undisturbed flocks of canvasbacks on Pool 19 in spring

2014.

Overall, diving ducks spent the majority of their time foraging, resting, or in motion, but comfort and maintenance activities (e.g., preening), social interactions, and alert behavior were also recorded (Table 11). Lesser scaup were observed foraging ($\bar{x}$ = 38.9%) more often than locomoting ($\bar{x}$ = 31.4%) or resting ($\bar{x}$ = 21.9%). Lesser scaup in the IRV spent less time feeding ($\bar{x}$ = 38.5%) and more time resting ($\bar{x}$ = 23.0%) than scaup at Pool 19, which foraged more ($\bar{x}$ = 40.3%) and rested less ($\bar{x}$ = 18.7%). Lesser scaup spent a significant proportion of time in motion in both the IRV ($\bar{x}$ = 31.9%) and Pool 19 ($\bar{x}$ = 29.7%). Overall, canvasback time foraging ($\bar{x}$ = 39.7%) was similar to lesser scaup, but canvasbacks rested a greater proportion of time ($\bar{x}$ = 33.0%) and spent less time in motion ($\bar{x}$ = 16.9%). Canvasbacks fed significantly less ($\bar{x}$ = 36.3%) and rested more ($\bar{x}$ = 35.8%) in the IRV than those observed at Pool 19 (feeding, $\bar{x}$ = 66.4%; resting, $\bar{x}$ = 11.2%), but canvasback observations were considerably less at Pool 19 (n = 259) than in the IRV (n = 2,020).

Across all IRV sites and segments of Pool 19, seeds and tubers, nektonic invertebrates, and benthic invertebrate density was 262.7 kg/ha (SE = 76.2; 234.4 lbs/ac; Table 12). Similar to previous years, we found food density was greater on Pool 19 than the IRV; however, to date we have only processed one set of random samples from Pool 19. Combined food totals for Pool 19 were 977.0 kg/ha (871.7 lbs/ac), but 97.0% of that estimate was benthic invertebrates. In the IRV, 203.2 kg/ha (SE = 51.8; 181.3 lbs/ac) was available to diving ducks, with seeds and tubers comprising 84.3% of that estimate.

Overall, the IRV contained greater seed and tuber abundances at random sites ($\bar{x}$ = 171.4 kg/ha; 152.9 lbs/ac) than Pool 19 ($\bar{x}$ = 29.4 kg/ha; 26.2 lbs/ac; Table 12). Lesser scaup tended to forage in areas with greater seed and tuber abundances ($\bar{x}$ = 261.0 kg/ha; 232.6 lbs/ac) in the IRV, but foraging sites at Pool 19 contained negligible additional biomass than random sites ($\bar{x}$ = 6.0 kg/ha; 5.4 lbs/ac; Table 13). Overall, Pool 19 contained far greater biomass of benthic invertebrates at random sites (947.1 kg/ha; 845.0 lbs/ac) than did the IRV (30.8 kg/ha; 27.5 lbs/ac). Lesser scaup tended to forage in areas with more benthic invertebrate biomass than random sites in the IRV ($\bar{x}$ = 68.7 kg/ha; 61.3 lbs/ac) but significantly less at Pool 19 ($\bar{x}$ = -856.5 kg/ha; -764.2 lbs/ac). Nektonic biomass estimates were drastically lower than benthic estimates in both the IRV and Pool 19. Overall, diving ducks foraged in in locations containing 0.7 kg/ha (0.6 lbs/ac) more nektonic biomass than random sites.

In the central IRV, mean biomass of invertebrates at foraging sites of experimentally-collected scaup tended to be greater than random locations; however, scaup fed in areas with less invertebrate

biomass more often than they did in areas with greater biomass (Table 14). Seed biomass at random and feeding locations was similar in the IRV and there was a slight tendency for scaup to feed in locations that contained less food biomass than random locations. Overall, we found little evidence to suggest that lesser scaup were selecting foraging locations with greater food densities than random locations.

Diet and Metabolite Sampling

We collected 153 lesser scaup in the IRV and analyzed 42 which were observed foraging and had sufficient food in the esophagus for inference (Table 15). We collected 21 canvasback in the IRV and analyzed 11 that were observed foraging and had sufficient food in the esophagus for inference (Table 16). We were unable to collect enough foraging canvasbacks on Pool 19 to present those results separately and have combined ($n = 2$) those diets with lesser scaup herein. Generally, plant material was observed more frequently and at a greater percent aggregate mass than invertebrates or other food items. Lesser scaup diet frequently (91% of birds) contained invertebrates, but overall aggregate percent biomass (39%) was less than plant material (61%). Notable food items included chironomids, sphaerid clams, redroot flatsedge, barnyardgrass, walter's millet, and nodding smartweed. Canvasbacks also consumed principally plant matter, with barnyardgrass, plant tubers, yellow nutsedge, and long-leaf pondweed as the most common taxa.

Mean DLD of diving ducks appeared to vary by region and location (Table 17). Diving ducks collected in the central IRV had a positive mean index of DLD, while birds collected near the Illinois and Mississippi River confluence and at Pool 19 of the Mississippi River had a negative mean DLD. We note that our sample of birds from Pool 19 was small in spring 2014 due to extensive ice cover and other logistical issues which prevented earlier and additional collection of ducks. Within the IRV, extensive variation was associated with food densities and metabolite values between wetlands. Coarsely, DLD values and seed densities were greater in the central IRV than the Illinois and Mississippi River confluence or Pool 19, but the relationship between DLD and overall seed density was inconsistent among wetlands. In the future, additional data may help more clearly elucidate the relationship between food density and DLD.

Banding

We banded 2,488 lesser scaup and 3 canvasbacks in spring 2014 during 26 trap nights (Table 18). Despite extensive trapping effort, canvasbacks failed to use baited traps sites and were seldom caught in traps. Conversely, lesser scaup were abundant and readily used baited sites and entered

swim-in traps. Anecdotally, we noticed the proportion of juvenile and female birds captured increased significantly during early April compared to most of March. Overall, approximately 85% of banded lesser scaup were male and 100% of captured canvasbacks were male. Apparent stopover duration of recaptured lesser scaup was 7.3 days, with females stopping over approximately 1 day less than males.

Discussion

Inclement weather, persistent ice cover through mid-March, and extreme temperature fluctuations here and in northerly areas of the Mississippi Flyway made diving duck surveys in spring 2014 challenging. At Pool 19 in late February and early March, diving ducks were concentrated at very high densities in the navigation channel and small openings along the bluffs, which made observing and accessing areas to obtain food samples logistically infeasible. Moreover, commercial fisherman and trapping and baiting activities of other researchers further confounded our early efforts to sample foraging locations of diving ducks on Pool 19 and may have ultimately contributed to lower overall use and/or stopover duration of diving ducks on Pool 19 last spring. In the IRV, persistent ice flows and ice coverage severely hampered trapping activities, especially early trapping which was focused on canvasbacks.

Despite these issues, diving duck use of the IRV and CMRV in spring 2014 was extensive and we were successful in locating and sampling foraging flocks for behavior and foraging individuals for diet and metabolite analysis. Although results were extremely variable across wetlands, the central IRV appeared to be of greater foraging habitat quality during spring than the Illinois and Mississippi River confluence region or Pool 19. However, mean DLD values were still near 0 in the IRV and below 0 in the other regions surveyed indicating that spring foraging habitat quality for diving ducks may have negative effects on condition of diving ducks stopping during migration. We note that these results are preliminary at this time.

Similar to other recent studies of spring-migrating diving ducks, moist-soil seeds and other plant materials were important food items. While several areas had abundant moist-soil seeds and tubers remaining from the previous growing season, some locations with notable food production in the previous growing season (e.g., Chautauqua National Wildlife Refuge) had relatively low densities of seeds and tubers during spring migration. Other areas that were not flooded during fall 2013 had greater moist-soil seed abundances and extremely high diving duck use (e.g., Spunky Bottoms, Emiquon National Wildlife Refuge). If spring foraging habitat is limited in the IRV and CMRV, selective spring-

flooding of moist-soil wetlands may be an important management practice in areas with water control capabilities.

Generally, patterns in diving duck behavior during spring were similar in 2013 compared to 2014. Diving ducks spent the majority of time foraging along both river systems. There appeared to be limited evidence that ducks consistently selected foraging locations with greater food density than random locations within each river system (Smith et al. 2012). While the mean seed and tuber densities of foraging locations were greater than random locations in behavior and collected bird data sets, the frequency at which individual birds used a foraging locations with greater food densities than random locations was typically below or near 50%.

According to optimal foraging theory, foragers are expected to distribute throughout available habitats in proportion to available food resources, absent other effects of disturbance of predation risk (i.e., Marginal Value Theorem). In future reports, we will compare foraging behavior, food selection, and food densities to evaluate optimal foraging models (Arengo and Baldassarre 1995). Due to reduced frequency and consistency of aerial surveys in 2014 compared to previous years and partial completion of sample processing to date, we hesitate to further compare use days, food densities, and foraging behavior in this report.

Overall food abundances in spring were similar in 2014 to 2013 in the IRV and may have been lower in Pool 19 in 2014, although our current sample size in small. Overall, food densities observed in the IRV were similar to those found by Straub et al. (2012) and overall availability may be quite low when estimates are adjusted for foraging thresholds (Stafford et al. 2011). Despite possible decreases from spring 2013, invertebrate density on Pool 19 was still quite high and is likely reflected by the extensive use by diving ducks during spring. As lesser scaup and canvasback use days were much less in the IRV than Pool 19, it appears as if food may be a limiting factor of diving duck abundance in the IRV.

We successfully completed transect surveys on Pool 19 during springs 2013 and 2014, but found that the parallel transects conducted in 2014 produced more reasonable population estimates and were logistically much more feasible. Moreover, parallel transect surveys produced estimates similar to aerial inventories at moderate population abundances. Differences were more pronounced at very high or low abundances. Overall, parallel transect surveys appear to be a viable option for further evaluation along river systems. We noted some potential visibility issues associated with birds using areas very near the transect line which could influence detection probability within close distance classes. Large

and dense aggregations of diving ducks occur on Pool 19 making traditional transect surveys logistically difficult and resulting estimates variable (Buckland et al. 2001). We suggest additional exploration of parallel transect surveys for waterfowl along river systems.

STUDY 116: DISTRIBUTION OF LARGE WADING BIRD COLONIES AND EAGLE NESTS IN ILLINOIS

Job 116.1: Monitoring of great blue heron and great egret colonies and nesting bald eagles in Illinois.

Objectives: 1) Determine the current status (i.e., present or absent) of known great blue heron and great egret colonies and bald eagle nests in Illinois not located during spring 2012 surveys.

2) Incidentally identify and mark bald eagle nests and wading bird colonies observed along survey routes.

Introduction

From 1983 to 2001, the Illinois Department of Natural Resources monitored wading bird colonies throughout the state of Illinois, but since then, monitoring has been inconsistent. Statewide, the number of active wading bird nests is declining and several regions that historically contained several high-density colonies now appear to be little used (e.g., lower Illinois River; Yetter et al. 2012). For example, of 16 historic wading bird colonies along the Illinois River from Ottawa to Meredosia, only 4 colonies were found active during spring 2012. In contrast, bald eagles (*Haliaeetus leucocephalus*) appear to be expanding their nesting activities in Illinois, which is significant because eagles are considered a critical species in many ecoregions by the Illinois Comprehensive Wildlife Conservation Plan. An updated database identifying the location of known eagle nests and wading bird nesting colonies was necessary to guide future wading bird conservation and set research priorities.

Methods

We used a fixed-wing aircraft to aerially search for known wading bird colonies (i.e., great blue heron [*Ardea herodias*] and great egret [*Ardea alba*]) and bald eagle nests in Illinois during March 2014. We grouped waypoints representing eagle nests (n = 103) and wading colonies (n = 104) into flight plans that encompassed all nests or colonies recorded as "missing" during 2012 (Yetter et al. 2012) and concurrently surveyed as many nearby areas as possible throughout Illinois. We opportunistically resurveyed nests and colonies along flight lines identified as "active" during the spring 2012 monitoring effort. We traveled to waypoints of previously known nesting locations and circled the waypoint for up to 0.5 mile until the nest or colony was located or determined to be absent. We verified nesting activity from ≤200 ft above ground level. We recorded species present; determined nest status as active, abandoned, or not found; and remarked (latitude/longitude coordinates) nests or

colonies that had apparently moved. One eagle nest could not be aerially inventoried due its proximity to a nuclear power plant, and nest status was documented on foot. We marked new nests and colonies, those incidentally encountered but not in the current database, with a new waypoint and recorded pertinent data.

Because eagle nests and colonies were monitored during springs 2012 and 2014, we deemed the status of an eagle nests as active if nesting activity was observed in either year; however, nests were considered abandoned if not used during spring 2014 even though the nest may have been active in 2012. Eagle nests were considered active if fresh nest material was observed in the nest bowl even though attendant adults were not witnessed in the vicinity of the nest. Due to the late spring, some wading bird colonies were not yet attended by adults at the timing of surveys in March 2014. However, colonies were considered active if intact nests (i.e., from previous nesting seasons) were observed during spring 2014. We assumed colonial nests would not persist for multiple years in the environment. We summarized nest density in active colonies across all species because many adults were not actively attending nests at the time surveys were conducted. All nest and colony locations were entered into a spreadsheet and summarized.

Results

We conducted four flights (>29 hrs; 6, 7, 11, and 28 March 2014) encompassing 555 known nesting locations throughout the state and verified nesting activity at 378 bald eagle nests and 177 wading bird (i.e., great blue heron and great egret) colonies (Fig. 8). In springs 2012–2014, we documented 39 wading bird colonies and 214 bald eagle nests previously not identified in the Illinois Department of Natural Resources geospatial database (IDNR unpublished data).

We verified 263 active eagle nests and 126 active wading bird colonies in Illinois (Table 19, Fig. 9). Many previously known eagle nests (n = 108) and wading bird colonies (n = 103) were not located during aerial surveys during springs 2012 and 2014. Sixty-three eagle nests were located but determined to be not active during our monitoring. We submitted a revised and expanded electronic spreadsheet (Microsoft Excel) of bald eagle nests and wading bird colonies to IDNR GIS specialist, Jeannie Barnes, in August 2014.

We compared current nest data with the IDNR wading bird and bald eagle database. The number of active wading bird colonies (n = 126) in Illinois during springs 2012–2014 was 37% greater than estimates of active colonies (n = 92) in 2001; however, the average number of nests in active colonies has declined. We documented 82.3 nests in active colonies (multiple species) over the 2-year

period. Using only data observed in 2012, great blue heron nests in active colonies declined 37% from 129.4 nests (2001) to 81.3 nests (2012). Additionally, nearly all known wading bird colonies along the Illinois River south of Peoria were vacant during springs 2012–2014, exceptions included Worley Lake near Pekin and the Emiquon complex (double crested cormorant [*Phalacrocorax auritus*] only) near Havana. In contrast, the number of active eagle nests (n = 263) in Illinois has likely tripled in the last decade. Bald eagles continue to expand their breeding distribution in Illinois; however, a more intensive investigation of wading bird colonies in Illinois and specifically the Illinois River valley is warranted.

STUDY 117: REPRODUCTIVE SUCCESS AND SURVIVAL OF THE EASTERN POPULATION OF SANDHILL CRANES

Job 117.1: Population ecology of sandhill cranes.

Objectives:

1) Estimate the reproductive success (average # of young produced per pair) of sandhill cranes in urban and rural landscapes of northeastern Illinois.

2) Estimate the survival of juvenile (individuals that no longer rely on parents but are not breeding) sandhill cranes in urban and rural landscapes of northeastern Illinois.

3) Estimate the survival of adult breeding sandhill cranes in urban and rural landscapes of northeastern Illinois.

Introduction

The eastern population of sandhill cranes (*Grus canadensis*) has recovered from a handful of individuals to be one of the fastest growing species in the Midwest. Given the rapid recovery of the species, interest in harvesting the species has grown, with a couple Midwestern states currently allowing harvest. While the population trajectory of cranes is similar to Canada geese (*Branta candensis*), as opposed to geese and nearly all other game birds, cranes have relatively low reproductive capacity. Cranes only produce one or two eggs per year and likely have relatively high adult survival. Thus, an evaluation of survival of sandhill cranes in different landscapes in northeast Illinois is needed.

In order to investigate the reproductive success of sandhill cranes, we estimated the survival of nests and fledglings in northeastern Illinois. Nests were located via aerial surveys and monitored until the eggs hatch. Young were radio-tagged and subsequently monitored to determine the fate of these individuals. We radio-tagged both juveniles and adults and monitored them during the breeding season every 2–3 days using vehicle-mounted radio receivers. After the breeding season, we used tower-mounted high-gain stacked yagi antennas attached to an automated radio unit (ARU) to passively monitor cranes. We used two of these units, one at the Chain-of-Lakes State Park in northeast Illinois and another at Jasper Pulaski Wildlife Area in Indiana.

The objectives of this research were to evaluate landscape-dependent reproduction and survival in the eastern population of greater sandhill cranes (*Grus canadensis tabida;* hereafter, crane) throughout the urban-to-rural gradient of northeastern Illinois. These objectives aim to address our

primary research question: Are the rapidly urbanizing landscapes of this population's Great Lakes' breeding region generating source or sink habitats? To this end we have focused on estimating three demographic vital rates, including 1) adult survival, 2) breeding productivity, and 3) recruitment – a parameter that is also of key interest to sustainably managing harvest of the population.

Results

During the 2012 and 2013 breeding seasons, we monitored crane nests (n = 152), radio-marked hatchings and pre-fledged young (n = 204), and captured and banded 85 hatch-year and 48 adult cranes. The cold temperatures and repeated flooding events during the spring of 2014 resulted in postponement of initial nesting attempts and widespread re-nesting throughout the breeding season. The resulting asynchrony in nesting, hatching, and fledging continues to necessitate extensive field work at this time and significant data on breeding productivity for the 2014 season remains to be collected and analyzed. However, 44 hatch-year birds and 22 adult cranes, four of which were recaptures of previously marked birds, have been captured and banded thus far in 2014, increasing the total number of marked birds to 195.

Preliminary estimates of average annual adult survival are comparable for both breeding and non-breeding cranes marked in 2012 and 2013 ($\bar{x}$ = 96%, SE = 3.77%; $\bar{x}$ = 97%, SE = 2.74%, respectively; Table 20). Average annual breeding productivity (i.e., the probability of a breeding pair successfully fledging young) to date is 16% (SE = 3.05%).

Discussion

The apparent prominence of urban development and, in particular, urban open spaces (i.e., park-like environments) in explaining high colt mortality is of particular interest. Specifically, our preliminary results reveal a negative correlation of approximately 1:1 between increases in the percentage of urban open spaces within 1500 m of nest sites and colt survival (Fig. 10). We believe this correlation is attributable to the relative ease in which young cranes may be preyed upon in these open landscapes and the preferential use of these landscapes by both cranes and common urban predators (e.g., raccoons, coyotes, red-tailed hawks). Although our observations of remains recovered in the field support predation as the primary source of colt mortality, specific causes mortality are sometimes obfuscated due to exposure to the elements and potential scavenging; however, we believe that future necropsies will confirm predation as the main cause of colt mortality.

Additionally, our data have thus far revealed lower than expected survival of juvenile birds (i.e., post-fledging to one year old; $\bar{x}$ = 43%, SE = 7.70%; Table 20). Such low juvenile survival is particularly concerning because recruitment in crane populations is traditionally estimated via surveying the proportion of juvenile cranes in flocks at fall staging and stopover sites (i.e., when young birds range from approximately 5–8 months of age). Traditional recruitment estimates may therefore fail to account for incidences of juvenile mortality during subsequent migration and on wintering grounds. Furthermore, because recruitment estimates are also prominent in harvest management decisions, failure to account for post-recruitment-survey juvenile mortality has clear potential to result in over estimating sustainable yields. Although these are preliminary data, low juvenile survival and high rates of colt morality in urban landscapes may have significant implications to future management approaches as interest in sport harvest grows throughout the Mississippi Flyway and urban sprawl continues to reshape the population's breeding range. A final report will be generated and submitted upon completion of the 2014 field season and subsequent statistical analyses.

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Disclaimer

Any opinions, findings, conclusions, or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of TNC, USFWS, Illinois DNR, Wisconsin DNR, Iowa DNR, or other organizations that supported this research.

Figure 1. Locations in the Illinois and central Mississippi river valleys aerially inventoried for waterfowl by the Illinois Natural History Survey during fall 2013.

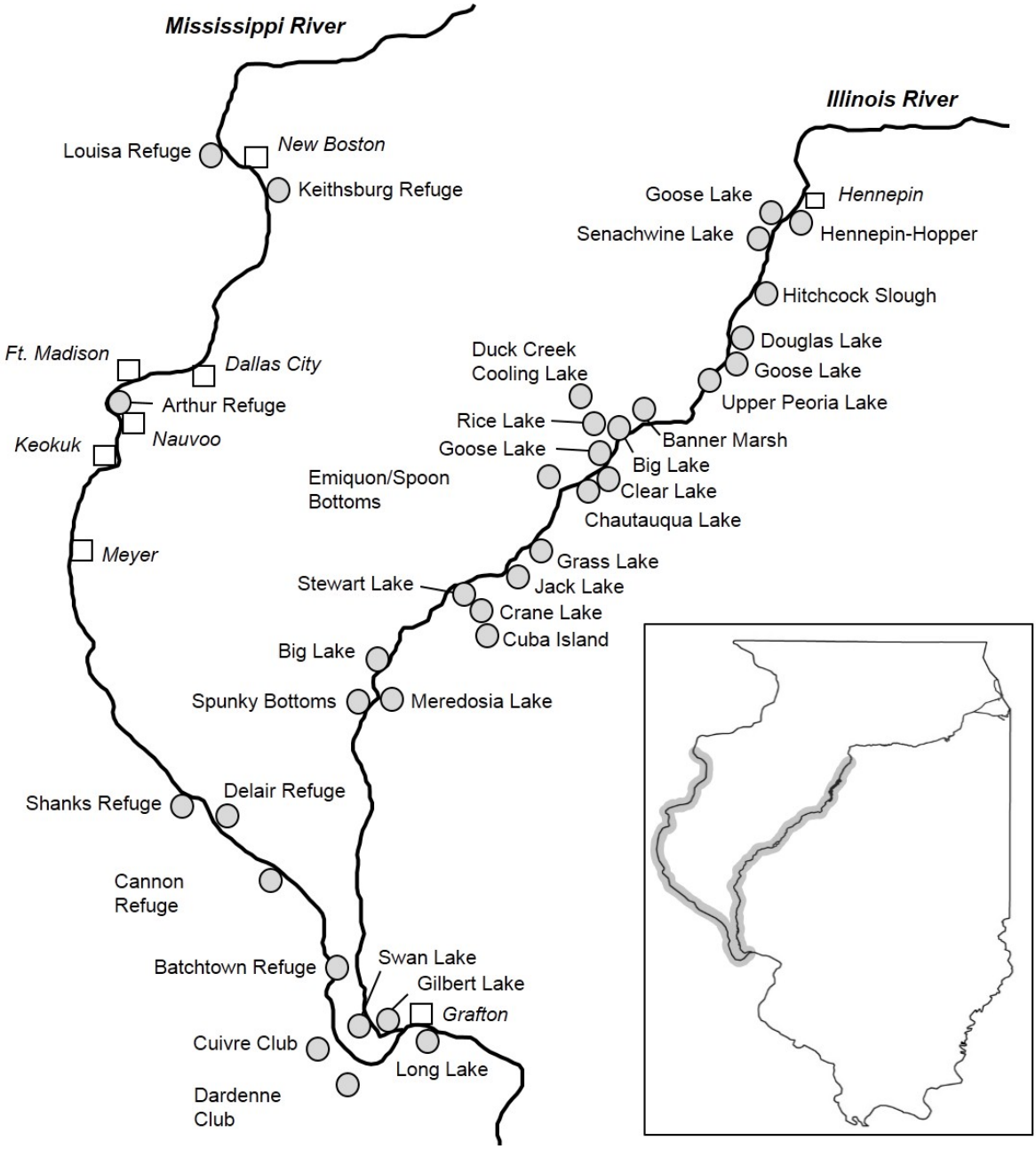


Figure 2. Water levels of the Illinois River during the 2013 growing season and fall waterfowl migration.

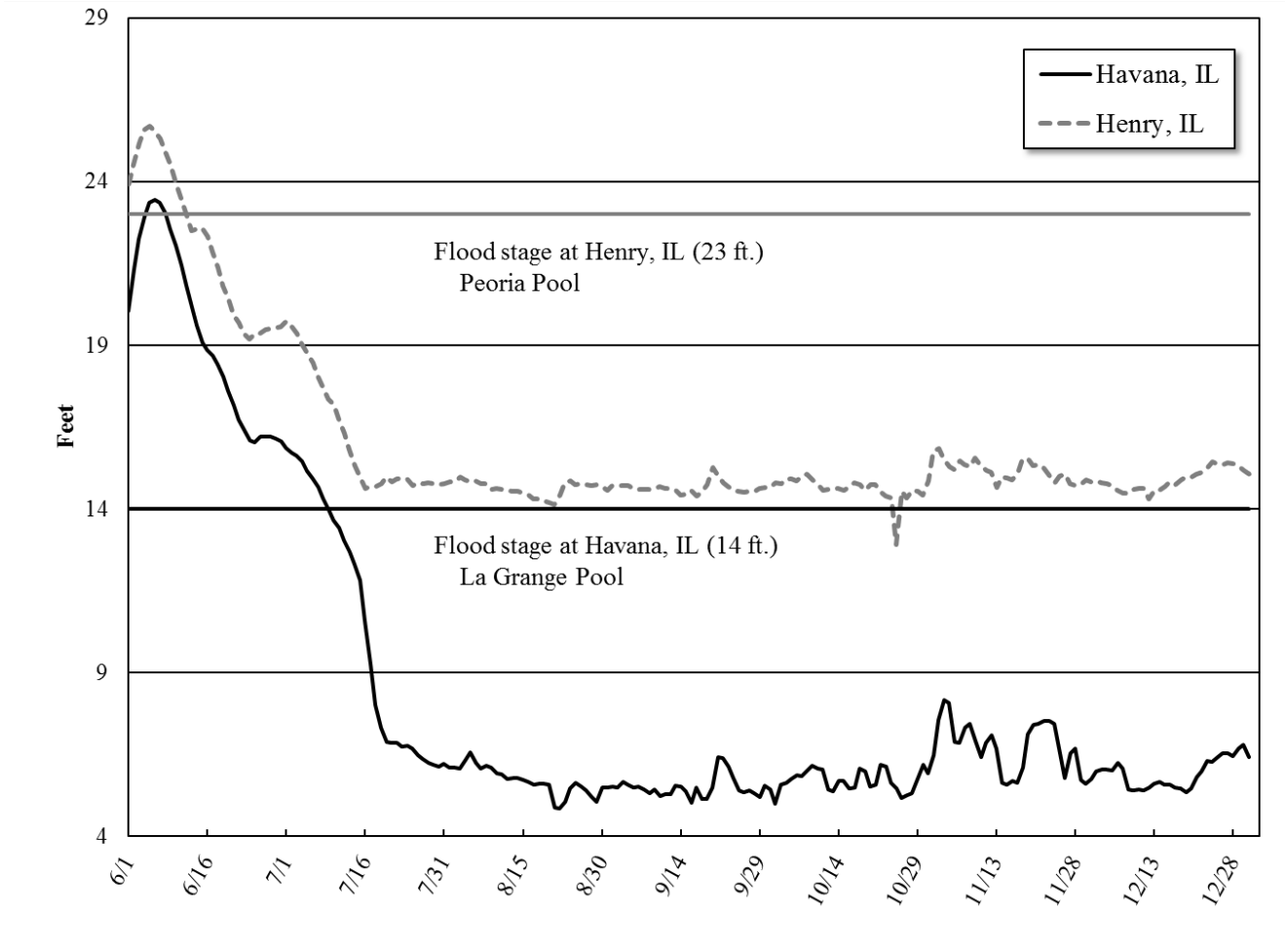


Figure 3. Estimated abundance of dabbling ducks, diving ducks, and total ducks observed during fall 2013 in the Illinois River valley.

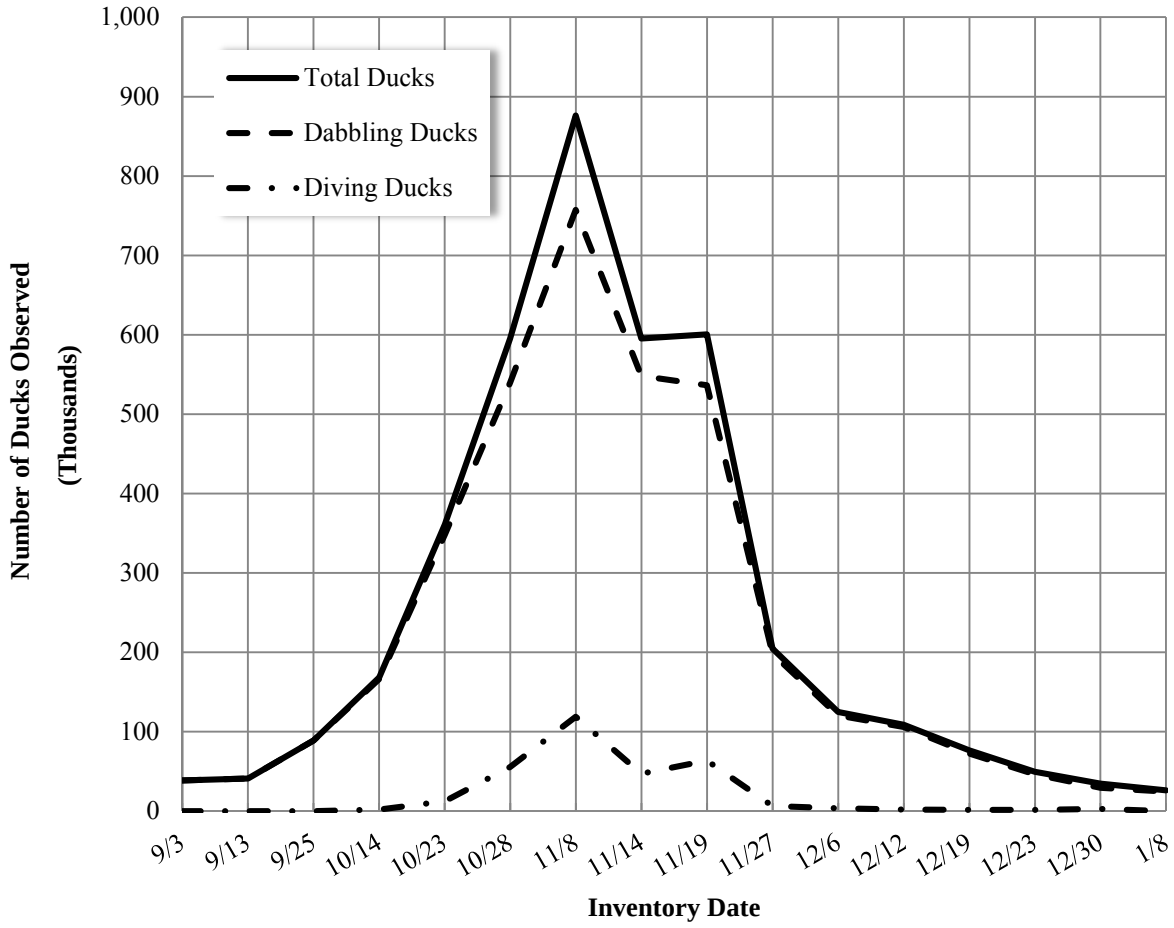


Figure 4. Estimated abundance of dabbling ducks, diving ducks, and total ducks observed during fall 2013 in the central Mississippi River valley.

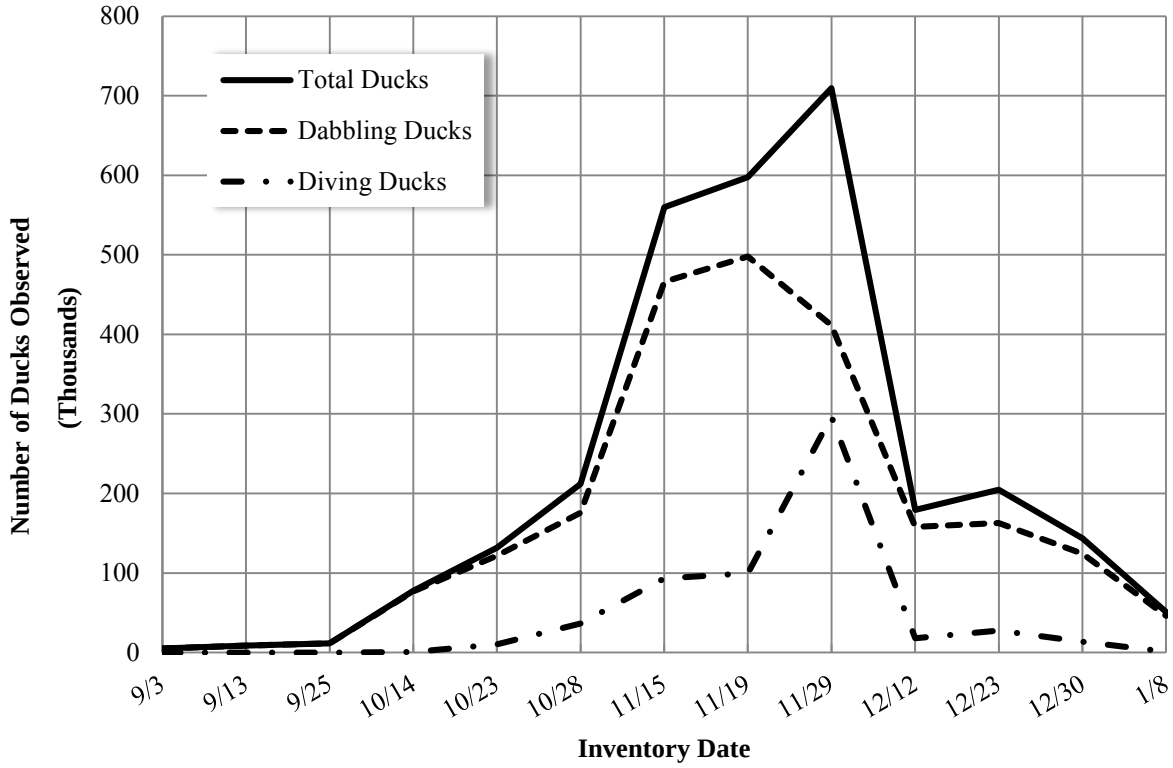


Figure 5. Total duck use-days observed during falls 1948–2013 in the Illinois River valley (IRV) and central Mississippi River valley (CMRV) of Illinois.

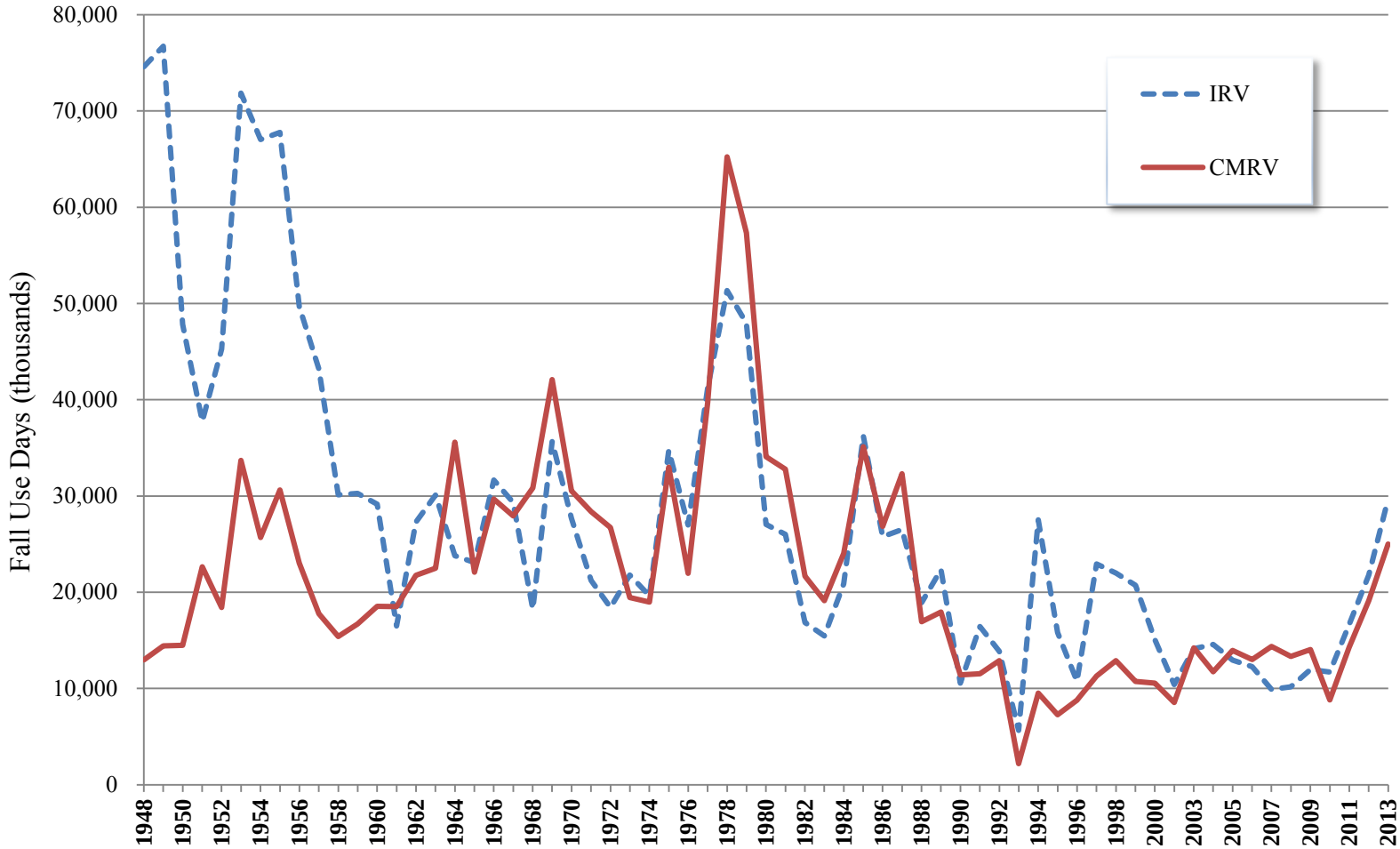


Figure 6. Locations in the Illinois and central Mississippi river valleys aerially inventoried for diving ducks by the Illinois Natural History Survey during spring 2014.

Figure 7. Transects (n = 5) and strata (Burlington and Dam) used along Pool 19 of the Mississippi River during 5 aerial surveys of diving ducks in March and April 2014.

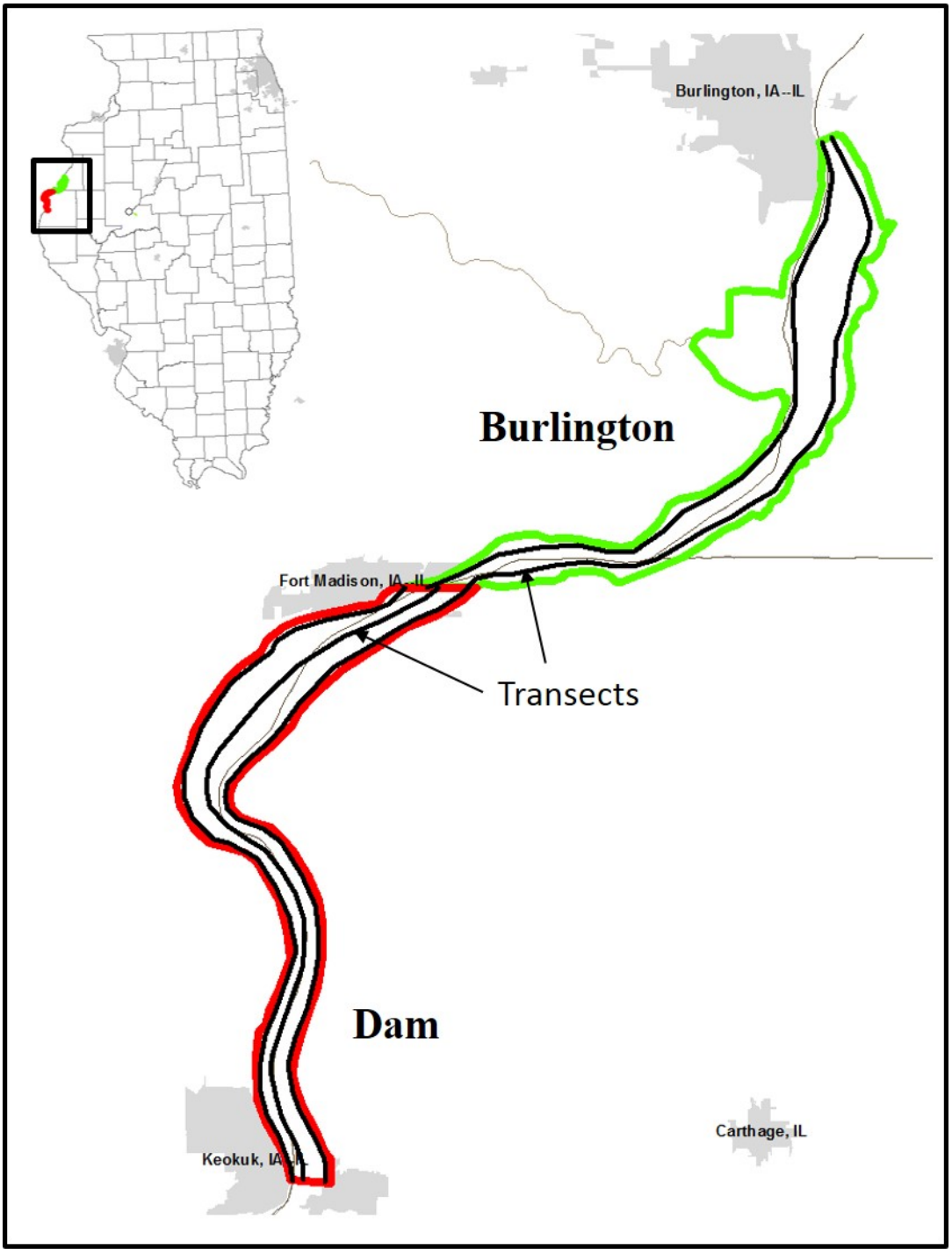


Figure 8. Map depicting flight plans for monitoring bald eagle nests (*Haliaeetus leucocephalus*, red dots) and wading bird colonies (great blue heron [*Ardea herodias*] and great egret [*A. alba*]) in Illinois and along the shoreline of the Mississippi, Ohio, and Wabash rivers adjacent to Illinois, spring 2014.

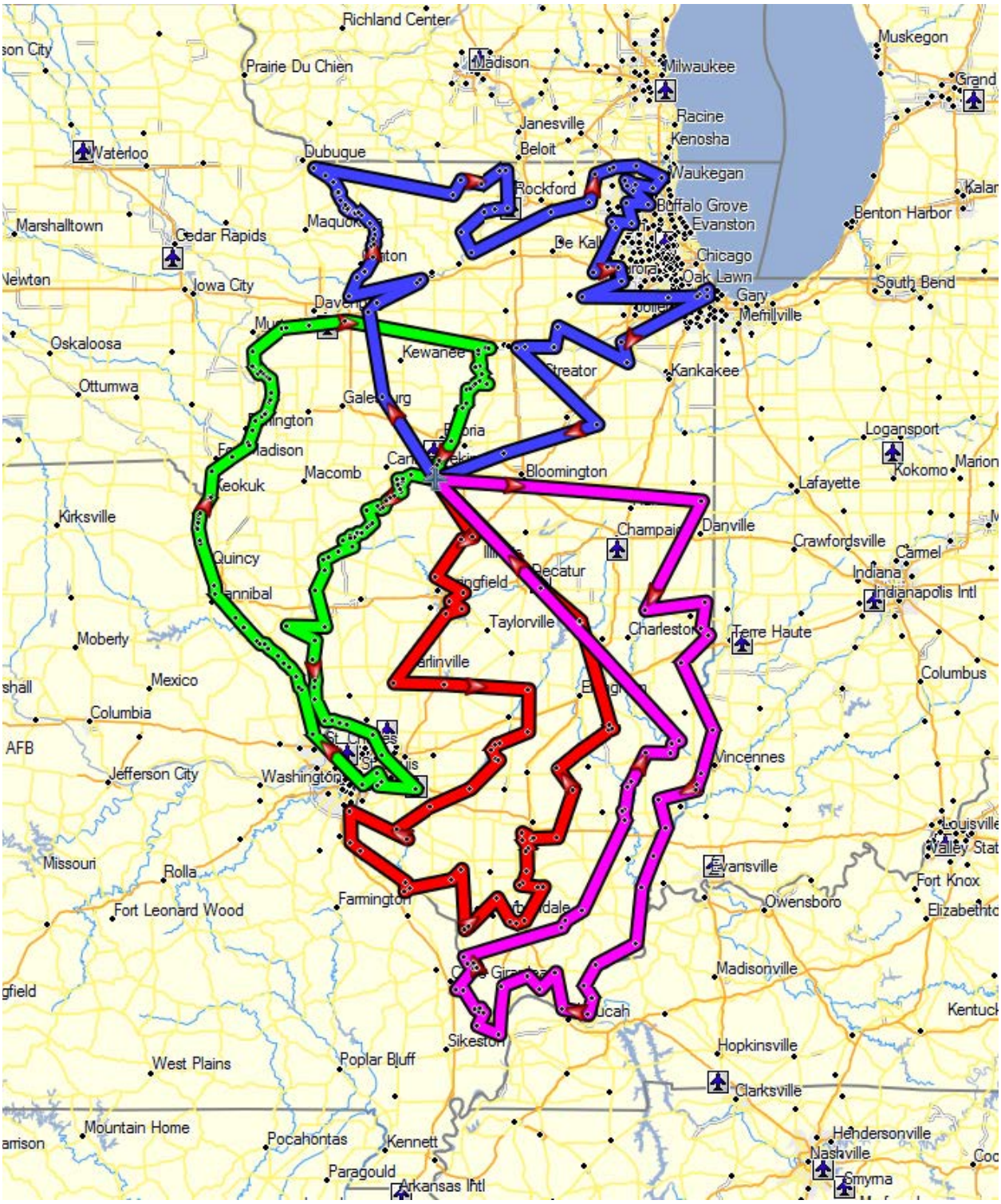


Figure 9. Distribution of bald eagle nests (*Haliaeetus leucocephalus*, red dots) and wading bird colonies (great blue heron [*Ardea herodias*] and great egret [*A. alba*]; blue squares) in Illinois and along the shoreline of the Mississippi, Ohio, and Wabash rivers adjacent to Illinois, springs 2012–2014.

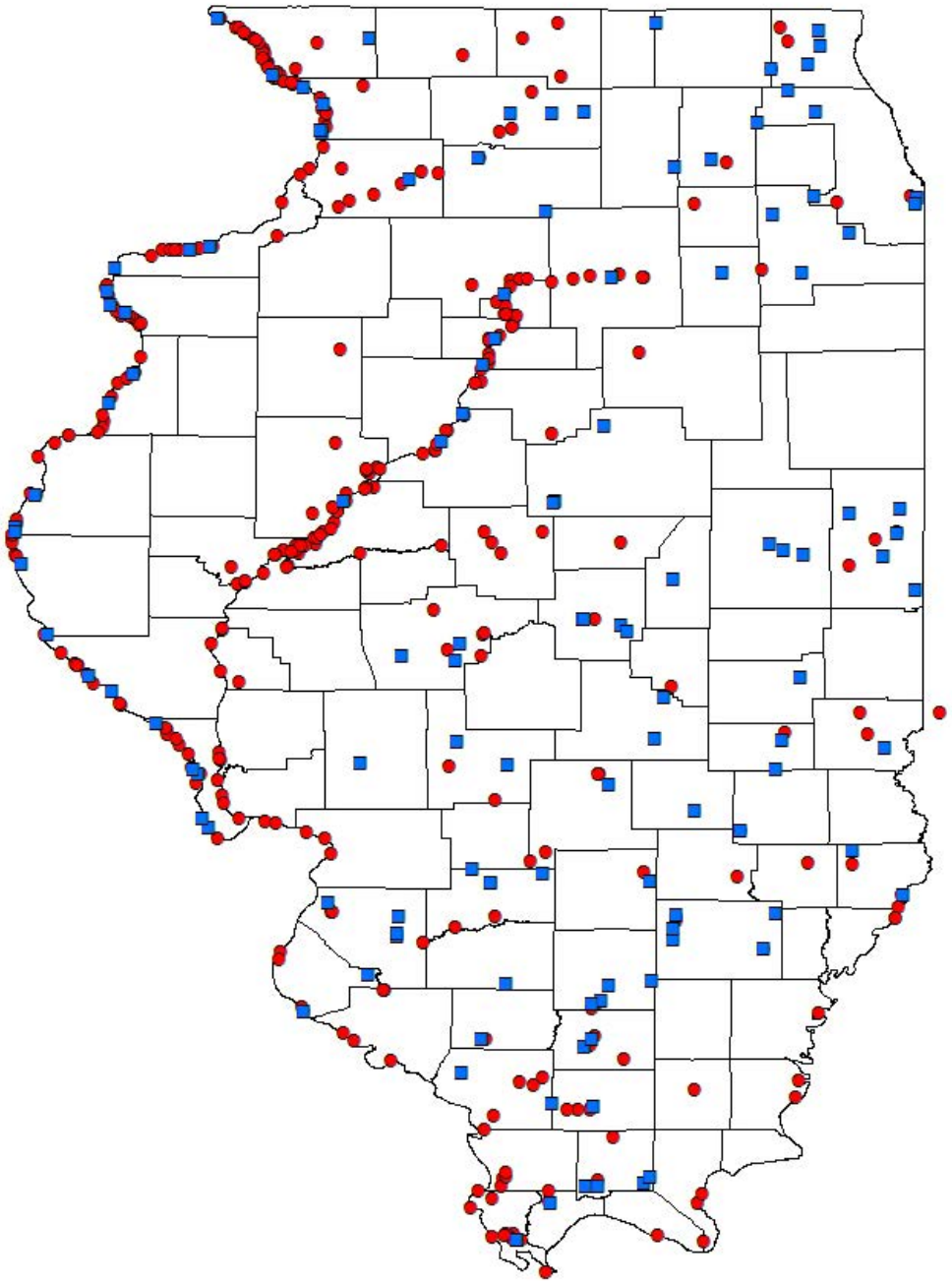
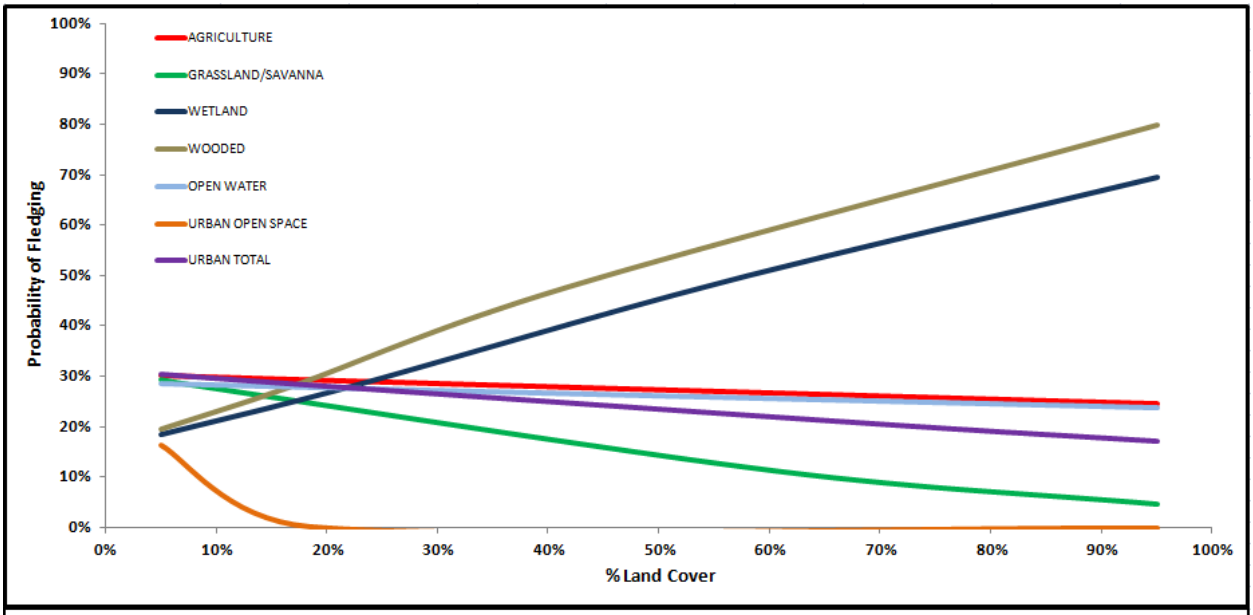


Figure 10. The probability of fledging (y-axis) relative to the percent of land cover within 1500m of nest sites (x-axis) and land cover correlation matrix (Pearson product moment correlation coefficients; r-squared values in parenthesis). Note that the urban open space metric was the best supported known-fate model in Program MARK v.8.0 and strongly correlated with fledging success (Pearson's r = -0.98; Table 3). Other land cover models were not well supported but trends are provided here for reference.



Land Cover Correlation Matrix

	AGRICULTURE	GRASSLAND/ SAVANNA	WETLAND	WOODED	OPEN WATER	BARREN	URBAN OPEN SPACE	URBAN
AGRICULTURE	1(1)	-0.36(0.13)	-0.45(0.2)	-0.13(0.02)	-0.54(0.29)	-0.14(0.02)	-0.33(0.11)	-0.43(0.19)
GRASSLAND/SAVANNA	-0.36(0.13)	1(1)	-0.03(0)	-0.08(0.01)	0.02(0)	0.01(0)	0.02(0)	-0.18(0.03)
WETLAND	-0.45(0.2)	-0.03(0)	1(1)	0.31(0.1)	0.18(0.03)	-0.06(0)	-0.2(0.04)	-0.32(0.1)
WOODED	-0.13(0.02)	-0.08(0.01)	0.31(0.1)	1(1)	-0.11(0.01)	0.13(0.02)	-0.17(0.03)	-0.42(0.18)
OPEN WATER	-0.54(0.29)	0.02(0)	0.18(0.03)	-0.11(0.01)	1(1)	0.07(0)	0.06(0)	0.26(0.07)
BARREN	-0.14(0.02)	0.01(0)	-0.06(0)	0.13(0.02)	0.07(0)	1(1)	0.24(0.06)	0.04(0)
URBAN OPEN SPACE	-0.33(0.11)	0.02(0)	-0.2(0.04)	-0.17(0.03)	0.06(0)	0.24(0.06)	1(1)	0.44(0.2)
URBAN	-0.43(0.19)	-0.18(0.03)	-0.32(0.1)	-0.42(0.18)	0.26(0.07)	0.04(0)	0.44(0.2)	1(1)

Table 1. Avian species encountered during fall 2013 and spring 2014 aerial inventories of the Illinois and central Mississippi rivers.

Common Name/Species Group	Scientific Name[a]	Abbreviation
Dabbling ducks		
Mallard	*Anas platyrhynchos*	MALL
American black duck	*Anas rubripes*	ABDU
Northern pintail	*Anas acuta*	NOPI
Blue-winged teal	*Anas discors*	BWTE
American green-winged teal	*Anas crecca*	AGWT
American wigeon	*Anas americana*	AMWI
Gadwall	*Anas strepera*	GADW
Northern shoveler	*Anas clypeata*	NSHO
Diving ducks		
Lesser scaup	*Aythya affinis*	LESC
Ring-necked duck	*Aythya collaris*	RNDU
Canvasback	*Aythya valisineria*	CANV
Redhead	*Aythya americana*	REDH
Ruddy duck	*Oxyura jamaicensis*	RUDU
Common goldeneye	*Bucephala clangula*	COGO
Bufflehead	*Bucephala albeola*	BUFF
Mergansers		
Common merganser	*Mergus merganser*	COME
Red-breasted merganser	*Mergus serrator*	RBME
Hooded merganser	*Lophodytes cucullatus*	HOME
Geese		
Greater white-fronted goose	*Anser albifrons*	GWFG
Canada goose	*Branta canadensis*	CAGO
Snow goose	*Chen caerulescens*	LSGO
American coot	*Fulica americana*	AMCO
American white pelican	*Pelecanus erythrorhynchos*	WHPE

[a] According to the American Ornithologists' Union Check-list, 2006.

Table 2. Peak abundance estimates of various species of waterfowl during falls 2012 and 2013, the average for 2008─2012 and the percent change (Δ) between 2013 and periods of interest.

Species and Regions	2012	2013	2008─2012 Average	% Δ from 2012	% Δ from 2008─2012
Mallard					
Illinois River	488,570	329,590	221,606	-33	49
Central Mississippi River	321,310	374,120	242,063	16	55
Illinois & Mississippi Rivers	809,880	735,580	450,048	-9	63
American black duck					
Illinois River	1,980	1,505	1,533	-24	-2
Central Mississippi River	1,260	625	1,082	-50	-42
Illinois & Mississippi Rivers	2,930	1,340	2,171	-54	-38
Northern pintail					
Illinois River	56,830	141,840	44,967	150	215
Central Mississippi River	75,205	98,950	47,926	32	106
Illinois & Mississippi Rivers	132,035	207,085	84,140	57	146
Blue-winged teal					
Illinois River	49,630	24,455	26,834	-51	-9
Central Mississippi River	11,080	4,920	5,574	-56	-12
Illinois & Mississippi Rivers	60,710	28,110	32,313	-54	-13
American Green-winged teal					
Illinois River	52,275	179,620	41,169	244	336
Central Mississippi River	40,175	79,120	32,430	97	144
Illinois & Mississippi Rivers	85,495	189,485	70,183	122	170
American wigeon					
Illinois River	1,660	14,160	5,082	753	179
Central Mississippi River	1,400	3,350	3,980	139	-16
Illinois & Mississippi Rivers	2,390	14,160	7,583	492	87
Gadwall					
Illinois River	54,590	146,300	35,934	168	307
Central Mississippi River	39,465	79,970	31,549	103	153
Illinois & Mississippi Rivers	89,420	189,080	65,283	111	190
Northern shoveler					
Illinois River	27,785	49,060	17,449	77	181
Central Mississippi River	13,100	21,545	7,229	64	198
Illinois & Mississippi Rivers	37,085	57,070	20,514	54	178
Dabbling Ducks					
Illinois River	583,370	757,405	298,250	30	154
Central Mississippi River	424,905	498,030	316,938	17	57
Illinois & Mississippi Rivers	1,008,275	1,034,510	592,043	3	75

Table 2. Continued.

Species and Regions	2012	2013	2008–2012 Average	% Δ from 2012	% Δ from 2008–2012
Lesser scaup					
Illinois River	3,950	1,530	3,687	-61	-59
Central Mississippi River	42,660	38,200	27,104	-10	41
Illinois & Mississippi Rivers	44,445	39,730	30,079	-11	32
Ring-necked duck					
Illinois River	24,000	88,610	16,709	269	430
Central Mississippi River	26,905	34,200	31,076	27	10
Illinois & Mississippi Rivers	50,905	81,400	46,857	60	74
Canvasback					
Illinois River	5,710	6,635	2,716	16	144
Central Mississippi River	138,400	261,550	72,438	89	261
Illinois & Mississippi Rivers	140,710	262,100	73,549	86	256
Redhead					
Illinois River	0	255	267	–	-4
Central Mississippi River	365	10	427	-97	-98
Illinois & Mississippi Rivers	365	255	566	-30	-55
Ruddy duck					
Illinois River	23,575	34,920	15,043	48	132
Central Mississippi River	27,550	15,465	17,288	-44	-11
Illinois & Mississippi Rivers	43,960	50,385	28,021	15	80
Common goldeneye					
Illinois River	4,165	1,255	1,975	-70	-36
Central Mississippi River	11,975	11,620	9,564	-3	21
Illinois & Mississippi Rivers	13,385	11,620	10,216	-13	14
Bufflehead					
Illinois River	1,205	660	1,250	-45	-47
Central Mississippi River	5,985	6,410	4,244	7	51
Illinois & Mississippi Rivers	7,190	6,420	5,075	-11	27
Diving ducks					
Illinois River	48,285	118,830	33,148	146	258
Central Mississippi River	179,585	296,655	113,861	65	161
Illinois & Mississippi Rivers	196,215	298,590	135,084	52	121
Total mergansers					
Illinois River	4,745	2,225	2,972	-53	-25
Central Mississippi River	24,610	3,155	11,971	-87	-74
Illinois & Mississippi Rivers	28,775	4,250	14,475	-85	-71

Table 2. Continued.

Species and Regions	2012	2013	2008–2012 Average	% Δ from 2012	% Δ from 2008–2012
Total ducks					
Illinois River	617,565	876,255	325,383	42	169
Central Mississippi River	531,040	709,375	405,614	34	75
Illinois & Mississippi Rivers	1,148,605	1,197,865	712,873	4	68
Greater white-fronted goose					
Illinois River	9,880	1,100	4,151	-89	-74
Central Mississippi River	1,975	550	1,947	-72	-72
Illinois & Mississippi Rivers	11,430	1,550	5,801	-86	-73
Canada goose					
Illinois River	22,870	16,170	20,402	-29	-21
Central Mississippi River	8,910	6,360	10,952	-29	-42
Illinois & Mississippi Rivers	31,525	16,870	30,651	-46	-45
Lesser snow goose					
Illinois River	17,000	0	3,748	-100	-100
Central Mississippi River	6,600	2,500	5,690	-62	-56
Illinois & Mississippi Rivers	21,010	2,500	8,864	-88	-72
American coot					
Illinois River	104,100	212,905	108,115	105	97
Central Mississippi River	39,360	49,340	20,584	25	140
Illinois & Mississippi Rivers	132,040	262,245	123,543	99	112

Table 3. Use-day estimates of waterfowl during falls 2012 and 2013, the average for 2008–2012 and the percent change (Δ) between 2013 and periods of interest.

Species and Regions	2012	2013	2008–2012 Average	% Δ from 2012	% Δ from 2008–2012
Mallard					
Illinois River	9,762,533	10,676,513	6,814,449	9	57
Central Mississippi River	7,175,330	10,528,393	5,957,271	47	77
American black duck					
Illinois River	52,223	33,220	40,904	-36	-19
Central Mississippi River	7,798	8,100	11,842	4	-32
Northern pintail					
Illinois River	2,782,958	3,862,698	1,749,028	39	121
Central Mississippi River	2,971,035	3,462,965	1,780,762	17	94
Blue-winged teal					
Illinois River	445,243	937,703	515,610	111	82
Central Mississippi River	234,833	181,415	100,632	-23	80
American green-winged teal					
Illinois River	2,778,785	5,409,538	1,912,111	95	183
Central Mississippi River	2,162,323	2,528,633	1,415,524	17	79
American wigeon					
Illinois River	40,860	391,258	153,889	858	154
Central Mississippi River	55,040	63,010	113,584	14	-45
Gadwall					
Illinois River	2,579,435	4,068,695	1,388,219	58	193
Central Mississippi River	1,775,718	1,786,513	1,092,886	1	63
Northern shoveler					
Illinois River	1,360,435	1,952,150	641,442	43	204
Central Mississippi River	643,608	560,148	246,363	-13	127
Dabbling ducks					
Illinois River	19,802,470	27,331,773	13,215,651	38	107
Central Mississippi River	15,025,683	19,119,175	10,718,862	27	78
Lesser scaup					
Illinois River	76,683	29,655	78,425	-61	-62
Central Mississippi River	1,167,888	811,408	596,569	-31	36
Ring-necked duck					
Illinois River	877,260	1,474,685	563,157	68	162
Central Mississippi River	822,035	762,128	793,025	-7	-4
Canvasback					
Illinois River	88,850	132,813	55,056	49	141
Central Mississippi River	966,048	3,439,535	1,098,416	256	213

Table 3. Continued.

Species and Regions	2012	2013	2008–2012 Average	% Δ from 2012	% Δ from 2008–2012
Redhead					
Illinois River	0	3,728	3,758	–	-1
Central Mississippi River	5,018	115	4,959	-98	-98
Ruddy duck					
Illinois River	863,700	673,673	499,854	-22	35
Central Mississippi River	820,793	463,043	470,131	-44	-2
Common goldeneye					
Illinois River	12,250	10,038	12,509	-18	-20
Central Mississippi River	236,128	155,840	115,817	-34	35
Bufflehead					
Illinois River	31,180	9,388	21,732	-70	-57
Central Mississippi River	95,995	129,835	75,732	35	71
Diving ducks					
Illinois River	1,949,923	2,333,978	721,738	20	223
Central Mississippi River	4,113,903	5,823,610	1,234,491	42	372
Total mergansers					
Illinois River	28,570	15,848	14,197	-45	12
Central Mississippi River	6,545	61,708	46,491	843	33
Total ducks					
Illinois River	21,780,963	29,681,598	14,464,338	36	105
Central Mississippi River	19,146,130	25,004,493	13,920,001	31	80
Greater white-fronted goose					
Illinois River	84,025	22,245	30,727	-74	-28
Central Mississippi River	35,168	17,610	24,848	-50	-29
Canada goose					
Illinois River	307,510	392,115	286,687	28	37
Central Mississippi River	373,300	333,725	299,182	-11	12
Lesser snow goose					
Illinois River	79,865	0	19,380	-100	-100
Central Mississippi River	133,865	28,693	79,162	-79	-64
American coot					
Illinois River	4,061,745	7,542,938	3,768,582	86	100
Central Mississippi River	1,790,895	1,148,915	796,483	-36	44

Table 4. Peak abundances of diving ducks and mergansers observed and percent change (Δ) from spring 2013 to 2014 along the Illinois River and Pool 19 of the Mississippi River in Illinois.

Species and Regions		2013	2014	Δ
Lesser scaup	Illinois River	97,645	124,710	28
	Pool 19	211,295	128,545	-39
Ring-necked duck	Illinois River	152,215	93,750	-38
	Pool 19	1,900	7,200	279
Canvasback	Illinois River	18,310	73,680	302
	Pool 19	98,300	94,670	-4
Redhead	Illinois River	2,085	2,555	23
	Pool 19	2,770	450	-84
Ruddy duck	Illinois River	58,555	12,400	-79
	Pool 19	10,050	8,060	-20
Common goldeneye	Illinois River	4,390	2,380	-46
	Pool 19	4,530	3,675	-19
Bufflehead	Illinois River	2,565	2,275	-11
	Pool 19	5,970	1,765	-70
Total diving ducks	Illinois River	333,975	312,100	-7
	Pool 19	325,015	235,225	-28
Common merganser	Illinois River	6,545	3,850	-41
	Pool 19	7,440	2,360	-68
Hooded merganser	Illinois River	365	30	-92
	Pool 19	0	10	0

Table 5. Diving duck and merganser use-day estimates in the Illinois River valley from aerial inventories during spring 2014 and spring 2013, for comparison.

Location	BUFF	CANV	COGO	COME	HOME	LESC	REDH	RNDU	RUDU	2014 Total	%[a]	2013 Total
Turner	193	458	0	0	145	6,313	0	0	0	7,108	0.1	4,403
Depue, Spring	600	3,673	360	3,840	0	10,930	0	0	188	19,590	0.4	44,480
Coleman	0	2,200	0	0	0	66,700	4,350	38,550	75	111,875	2.0	37,000
Bureau Ponds	823	0	0	120	0	28,478	0	0	2,250	31,670	0.6	55,430
Goose (Putnam)	495	4,400	0	120	0	45,395	0	30,325	5,138	85,873	1.6	191,760
Senachwine	300	13,920	0	360	0	88,625	1,110	2,400	2,843	109,558	2.0	107,485
Hennepin/Hopper	1,355	16,838	0	0	0	194,818	8,350	20,458	13,043	254,860	4.7	4,098
Swan	0	3,600	0	360	0	54,950	7,250	5,300	1,450	72,910	1.3	51,160
Sawmill	0	3,600	0	0	0	8,750	0	0	0	12,350	0.2	28,935
Billsbach	0	12,000	0	0	0	18,195	750	20,050	1,450	52,445	1.0	52,475
Weis	600	3,600	0	0	0	59,950	0	14,575	1,450	80,175	1.5	57,885
Sparland	1,320	6,240	0	0	0	30,000	2,763	3,600	3,190	47,113	0.9	40,030
Wightman	120	0	0	0	0	6,870	0	1,450	100	8,540	0.2	4,160
Sawyer	0	3,600	0	0	0	8,325	0	725	0	12,650	0.2	7,990
Hitchcock	0	1,200	0	0	0	5,550	240	22,950	2,600	32,540	0.6	27,805
Babbs	0	1,200	600	0	0	65,150	0	0	3,715	70,665	1.3	50,960
Meadow	600	1,925	0	0	290	25,388	0	4,100	375	32,678	0.6	5,705
Douglas	800	12,363	0	0	0	53,738	0	13,050	825	80,775	1.5	70,763
Goose (Woodford)	2,400	18,000	2,400	600	0	178,558	0	3,045	6,825	211,828	3.9	113,438
Upper Peoria	1,200	14,400	4,200	2,760	0	74,795	0	1,200	15,700	114,255	2.1	371,630
Lower Peoria	145	0	0	120	0	32,650	0	0	2,400	35,315	0.6	77,120
Pekin	0	8,450	0	0	0	199,200	0	14,540	0	222,190	4.1	34,165
Powerton	0	0	0	0	0	0	0	0	0	0	0.0	250
Spring	145	600	0	960	240	145	0	0	0	2,090	0.0	12,058
Spring Bottoms	720	0	0	120	0	7,698	2,200	1,200	0	11,938	0.2	23,845
Goose (Fulton)	0	78,000	1,200	6,000	0	90,000	2,400	145,450	0	323,050	5.9	117,310
Rice	218	4,873	0	600	0	12,990	0	0	14,900	33,580	0.6	78,470
Big (Fulton)	6,000	24,073	0	0	0	144,218	3,600	55,685	12,968	246,543	4.5	124,350
Banner Marsh	265	0	240	720	0	20	0	0	0	1,245	0.0	29,458

Table 5. Continued.

Location	BUFF	CANV	COGO	COME	HOME	LESC	REDH	RNDU	RUDU	2014 Total	%[a]	2013 Total
Duck Creek	0	0	0	2,760	0	1,200	0	0	0	3,960	0.1	2,385
Clear	0	7,320	0	240	0	139,123	0	8,900	2,835	158,418	2.9	33,588
Chautauqua	1,485	60,845	360	360	0	49,820	3,770	62,600	28,815	208,055	3.8	1,261,070
Quiver Creek	0	6,000	0	0	0	3,150	0	60,000	0	69,150	1.3	0
Quiver	0	4,800	240	0	0	23,875	0	14,050	0	42,965	0.8	24,300
Spoon River Btms	0	0	0	0	0	1,345	0	363	0	1,708	0.0	7,475
Emiquon Preserve	10,040	44,158	7,560	14,315	0	124,060	7,320	38,190	112,710	358,353	6.6	346,110
Emiquon NWR	4,560	135,600	10,080	7,020	0	62,400	0	67,345	9,030	296,035	5.4	24,755
Matanza	0	2,400	0	0	0	1,240	0	0	1,200	4,840	0.1	34,898
Bath Lake	0	123,600	0	0	0	61,525	0	65,800	0	250,925	4.6	7,410
Moscow	0	12,000	0	0	0	8,143	0	32,175	435	52,753	1.0	181,878
Jack	1,200	2,505	600	1,800	0	31,548	870	6,380	2,975	47,878	0.9	63,915
Grass	0	7,320	0	0	0	29,345	0	42,750	18,745	98,160	1.8	176,288
Anderson	0	10,100	720	2,400	0	8,925	0	1,200	73,495	96,840	1.8	161,295
Snicarte	0	38,400	0	0	0	26,175	0	101,800	0	166,375	3.0	7,740
Ingram	0	7,200	0	0	0	13,345	0	16,350	0	36,895	0.7	43,880
Chain	0	0	0	0	0	8,120	0	5,800	14,500	28,420	0.5	7,655
Stewart	0	2,400	0	0	0	63,263	0	12,000	4,473	82,135	1.5	48,935
Crane	0	10,920	0	120	0	51,315	0	48,000	4,050	114,405	2.1	140,650
Cuba Island	0	3,600	0	0	0	42,110	1,450	120,750	0	167,910	3.1	169,970
Sanganois	145	290	0	1,200	0	9,228	0	35,890	0	46,753	0.9	107,685
Treadway	0	20,400	0	0	0	30,875	2,900	21,250	3,850	79,275	1.4	49,950
Muscooten	0	20	0	0	0	0	0	4,350	0	4,370	0.1	88,290
Big (Brown)	0	10,800	0	0	0	18,585	0	146,575	4,013	179,973	3.3	140,700
Meredosia	0	49,200	0	0	0	22,905	2,900	75,950	870	151,825	2.8	184,195
Smith	0	1,200	0	0	0	145	508	0	520	2,373	0.0	16,150
Spunky Bottoms	1,200	126,000	0	1,200	0	42,150	10,080	200,900	10,470	392,000	7.2	1,155
Total Illinois River	36,928	926,288	28,560	48,095	675	2,392,308	62,810	1,588,020	384,468	5,468,150		5,156,935

[a] Percent of total use days from each site relative to the overall total use days in 2014.

Table 6. Use-day estimates of diving ducks and mergansers on Pool 19 of the Mississippi River from aerial inventories during spring 2014 and spring 2013, for comparison.

Location	BUFF	CANV	COGO	COME	HOME	LESC	REDH	RNDU	RUDU	2014 Total	%[a]	2013 Total
Keokuk–Nauvoo	16,343	472,983	3,738	10,883	115	1,138,778	5,175	32,503	42,813	1,723,328	35.6	4,279,058
Arthur Refuge	0	2,300	0	115	0	119,310	0	0	200	121,925	2.5	43,795
Nauvoo–Ft. Madison	8,660	217,853	43,528	14,758	0	1,231,570	0	7,775	61,190	1,585,333	32.8	4,822,133
Ft. Madison–Dallas City	3,370	62,050	1,208	10,530	0	417,125	0	6,850	13,038	514,170	10.6	697,795
Dallas City–Burlington	60	276,633	575	0	0	336,095	0	57,500	2,340	673,203	13.9	218,270
Turkey Slough	40	128,800	0	1,150	0	52,765	0	0	2,530	185,285	3.8	78,075
Burlington–Dam 18	0	0	0	0	0	32,640	0	0	0	32,640	0.7	6,200
Total Pool 19	28,473	1,160,618	49,048	37,435	115	3,328,283	5,175	104,628	122,110	4,835,883		10,145,325

[a] Percent of total use days from each site relative to the overall total use days in 2014.

Table 7. Total abundance (N) by species and survey date with coefficients of variation (CV) and percent differences (Δ) between total population sizes estimated during parallel transect surveys with Program Distance compared to inventory surveys at Pool 19 of the Mississippi River during spring 2014.

Survey Date	BUFF		CANV		COGO		COME		LESC		REDH		RNDU	
	N	CV	N	CV	N	CV	N	CV	N	CV	N	CV	N	CV
Transect Surveys														
March 17, 2014	2,308	96%	238,600	33%	2,778	57%	6,692	29%	184,160	35%	0		1,698	83%
April 7, 2014	796	48%	1,539	73%	288	57%	16	75%	141,100	23%	0		0	
April 9, 2014	610	65%	150	94%	0	0%	421	61%	81,536	30%	50	96%	0	0%
April 15, 2014	102	91%	0	0%	0	0%	0	0%	12,153	46%	0		0	
April 21, 2014	217	51%	0	0%	0	0%	0	0%	1,414	43%	0		0	0%
Inventory Surveys														
March 17, 2014	90		94,670		3,675		2,360		126,510		450		7,200	
April 7, 2014	1,765		5,885		590		570		128,545		0		1,605	
April 9, 2014	1,575		1,040		0		935		89,120		0		835	
April 15, 2014	130		10		0		0		6,230		0		0	
April 21, 2014	20		5		0		0		430		0		10	
Difference	13%		136%		-28%		84%		20%		-89%		-82%	

Table 7. Continued.

Survey Date	RUDU		TOTAL	
	N	CV	N	CV
Transect Surveys				
March 17, 2014	290	64%	436,520	24%
April 7, 2014	2,987	57%	146,730	22%
April 9, 2014	15,166	72%	97,934	27%
April 15, 2014	1,158	64%	13,413	42%
April 21, 2014	940	47%	2,571	31%
Inventory Surveys				
March 17, 2014	2,420		235,215	
April 7, 2014	1,395		147,020	
April 9, 2014	10,050		98,530	
April 15, 2014	6,495		6,995	
April 21, 2014	700		1,325	
Difference	-2%		43%	

Table 8. Density (total diving ducks/ha) and detection probability (p) by and survey date of total diving ducks and mergansers with upper (UCL) and lower (LCL) 95% confidence intervals from parallel transect surveys at Pool 19 of the Mississippi River during spring 2014.

Survey Date	Density			Detection Probability		
	$\bar{x}$	LCL	UCL	p	LCL	UCL
March 17, 2014	10.74	6.62	17.42	0.76	0.71	0.82
April 7, 2014	3.61	2.26	5.77	0.59	0.52	0.67
April 9, 2014	2.41	1.31	4.42	0.62	0.56	0.69
April 15, 2014	0.33	0.12	0.84	0.57	0.47	0.68
April 21, 2014	0.06	0.01	0.11	0.51	0.39	0.66

Table 9. Chronology of lesser scaup (*Aythya affinis*) collection, behavioral observations, and core and sweep net sampling at foraging sites and random locations during spring 2014 in the Illinois and central Mississippi river valleys of Illinois.

River	Location	Sampling Dates											
		Collection				Random		Feed Site			Behavior Observations		
		1	2	3	4	1	2	1	2	3	1	2	3
MS	Pool 19 North	4/7						4/7					
	Pool 19 – Reed's Landing					4/2		4/7			4/1	4/7	
	Pool 19 – Dam					4/1		4/1	4/7		4/1	4/7	
	Pool 19 – Riley Creek	4/2	4/7			4/2		4/2	4/7		4/1	4/7	
IL	Anderson Lake	3/22											
	Babbs Slough (Marshall Co.)	3/19				3/20		3/20					
	Bath Lake	3/19	3/20			3/20		3/20			3/24		
	Big Lake					3/21		3/21			3/21	3/23	
	Carlson Unit (Anderson Lake)	3/21	3/22			3/19		3/19	3/21		3/19	3/24	
	Chain Lake	3/31				3/31		3/31			3/31		
	Chautauqua NWR (South Pool West)	3/23											
	Otter Lake	3/31				3/31		3/31			3/31		
	Flag Lake	3/13	3/15	3/17	4/13	3/18	4/13	3/18	4/13				
	Fowler Lake	3/28	3/29			3/29		3/29					
	Fuller Lake	3/28				3/29		3/29					
	Godar	3/29				3/29		3/29					
	Goose Lake (Woodford Co.)	3/20	3/21			3/20		3/20	3/31				
	Hennepin/Hopper Lakes	4/8	4/9			4/8		4/8	4/9				
	Lacey Ditch					3/27		3/27	4/2		3/27	3/31	4/1
	Lower Peoria Lake	3/7	3/10			3/16		3/7	3/10	3/16			
	Marshall County Conservation Area										3/19		
	Moscow Bay	4/3				4/1		4/1	4/3		4/1		
	Quiver Creek	2/20	2/21	3/11		2/21	3/11	2/21	3/11				
	Quiver Lake	3/5	3/6			3/5		3/5	3/6	3/17	3/5	3/14	
	Spunky Bottoms	3/18				3/18		3/18					
	Swan Lake NWR	3/25	3/26			3/27		3/27			3/25		
	Thompson Lake South	3/15				3/18		3/18					
	Upper Peoria Lake	3/7						3/7					
	Worley Lake	4/8				4/1		4/1	4/8		4/1		
	Wilder Tract	3/11	3/14			3/11		3/11			3/11		
	Zemple					3/17		3/17			3/14		

Table 10. Chronology of canvasback (*Aythya valisineria*) collection, behavioral observations, and core and sweep net sampling at foraging sites and random locations during spring 2014 in the Illinois and central Mississippi river valleys of Illinois.

River	Location	Sampling Dates							
		Collection		Random		Feed Site		Behavior Observations	
		1	2	1	2	1	2	1	2
MS	Pool 19 – Reed's Landing			4/2		4/2		4/1	
	Pool 19 – Dam	4/7		4/1					
	Pool 19 – Riley Creek	4/2		4/2					
IL	Bath Lake	3/19		3/20		3/19			
	Carlson Unit (Anderson Lake)			3/19		3/19	3/23	3/19	
	Chautauqua NWR (Setback)	3/10	3/11	3/11		3/11			
	Chautauqua NWR (South Pool East)			3/17		3/17		3/14	
	Emiquon Preserve - Flag Lake	4/13		4/13		4/13			
	Hennepin/Hopper Lakes	4/8		4/8					
	Lower Peoria Lake	3/10		3/16					
	Quiver Creek	2/24	3/5	2/25	3/11	2/25	3/11		
	Quiver Lake	3/10		3/5					
	Spunky Bottoms			3/18		3/18		3/18	
	Swan Lake	3/26		3/27		3/27			
	Emiquon Preserve - Thompson Lake North	4/3		4/3					
	Wilder Tract	3/11		3/11		3/11	3/15	3/11	3/14
	Zemple			3/17		3/17		3/14	

Table 11. Estimates of proportion of individuals engaged in behaviors (%) of canvasback (CANV) and lesser scaup (LESC) during spring 2014 in the Illinois River valley and Pool 19 of the central Mississippi River valley of Illinois.

Species	Behavior	Overall[a]	Illinois River			Pool 19		
			Total	Male	Female	Total	Male	Female
LESC	Feed	38.9	38.5	38.1	40.0	40.3	41.0	38.3
	Rest	21.9	23.0	23.8	20.0	18.7	17.4	22.1
	Other	4.4	3.5	2.9	5.6	7.4	6.8	9.1
	Social	0.9	1.0	1.0	1.0	0.4	0.4	0.3
	Motion	31.4	31.9	32.2	30.9	29.7	30.7	27.0
	Alert	2.4	2.1	2.0	2.5	3.5	3.6	3.1
CANV	Feed	39.7	36.3	36.6	35.3	66.4	65.6	67.2
	Rest	33.0	35.8	36.0	35.5	11.2	10.7	11.7
	Other	7.4	7.1	6.4	8.9	10.0	10.7	9.4
	Social	1.0	0.9	1.1	0.4	1.5	2.3	0.8
	Motion	16.9	17.8	18.2	16.4	10.4	9.9	10.9
	Alert	1.9	2.1	1.6	3.5	0.4	0.8	0.0

[a] Behavioral observations combined across both rivers.

Table 12. Biomass estimates[a] (kg/ha; $\bar{x}$ with standard errors [SE]) of benthic seeds and tubers (Seeds), nektonic invertebrates, benthic invertebrates, and overall food resources (Overall) from sweep and core samples by collection site and date of random samples during spring 2014 in the Illinois River valley and Pool 19 of the central Mississippi River valley of Illinois.

Site	Collect Date	Seeds	Invertebrates		Overall
			Nektonic	Benthic	
Illinois River					
Babb's Slough	3/20/2014	0.1	0.1	22.8	22.9
Rice Lake SFWA - Big Lake Unit	3/21/2014	26.4	0.2	33.4	60.0
Anderson Lake SFWA - Carlson Unit	3/19/2014	447.4	5.2	24.7	477.3
Chain Lake	3/21/2014	154.9	0.4	5.8	161.0
Chautauqua NWR	3/16/2014	160.8	0.1	16.4	177.3
Emiquon Preserve	3/18/2014	106.2	0.4	14.6	121.1
Mississippi River SFWA - Fowler Lake Unit	3/29/2014	116.6	0.1	42.0	158.6
Mississippi River SFWA - Fuller Lake Unit	3/29/2014	73.7	0.2	18.6	92.5
Mississippi River SFWA - Godar Unit	3/29/2014	126.8	0.4	53.6	180.7
Sue and Wes Dixon Refuge at Hennepin & Hopper	4/8/2014	135.4	3.5	20.2	159.1
Swan Lake NWR	3/27/2014	72.0	0.8	105.7	178.5
Worley Lake	4/1/2014	637.2	0.0	12.1	649.3
Mississippi River					
Pool 19 - Sheridan to Larry Creeks	4/2/2014	29.4	0.5	947.1	977.0
Illinois River Valley	$\bar{x}$	171.4	0.9	30.8	203.2
	SE	53.2	0.5	7.8	51.8
	CV	31.0%	51.0%	25.4%	25.5%
Overall	$\bar{x}$	160.5	0.9	101.3	262.7
	SE	50.2	0.4	70.8	76.2
	CV	31.2%	48.8%	69.9%	29.0%

[a] To convert kg/ha to lbs/ac, multiple by 0.8922

Table 13. Biomass estimates[a] (kg/ha) of benthic seeds and tubers, nektonic invertebrates, and benthic invertebrates at and with differences between (Δ) feeding and random sites where lesser scaup (*Aythya affinis*) behavior observations were conducted along with the percent frequency (*f*) of locations where biomass in feed sites exceeded that from random sites during spring 2014 in the Illinois River valley (IRV) and Pool 19 of the central Mississippi River valley of Illinois.

Sample Type	Location	Feed	Random	Δ	*f*
Invertebrates					
Benthic Samples					
	IRV	97.6	28.9	68.7	44.4%
	Pool 19	90.5	947.0	-856.5	0.0%
	Overall	94.9	90.1	4.8	28.6%
Nektonic Samples					
	IRV	0.8	0.8	0.0	11.1%
	Pool 19	2.7	0.5	2.2	40.0%
	Overall	1.5	0.8	0.7	21.4%
Seeds and Tubers					
Benthic Samples					
	IRV	261.0	160.1	100.9	55.6%
	Pool 19	23.4	29.4	-6.0	40.0%
	Overall	166.0	151.4	14.6	50.0%

[a] To convert kg/ha to lbs/ac, multiple by 0.8922

Table 14. Biomass estimates[a] (kg/ha) of benthic seeds and tubers and nektonic and benthic invertebrates with percent differences between (Δ) feeding locations where lesser scaup (*Aythya affinis*) were experimentally collected and random locations within the same site along with the percent frequency (*f*) of locations where biomass in feed sites exceeded that from random sites during spring 2014 in the Illinois River valley of Illinois.

Location	Feed	Random	Δ	*f*
Invertebrates				
Central Illinois River Valley	40.7	18.3	230.0%	47.4%
Illinois / Mississippi River Confluence	66.3	62.0	68.5%	50.0%
Overall	49.5	33.4	174.3%	48.3%
Seeds				
Central Illinois River Valley	164.3	171.9	38.4%	47.4%
Illinois / Mississippi River Confluence	87.3	86.9	-7.7%	40.0%
Overall	137.8	142.6	22.5%	44.8%
Overall				
Central Illinois River Valley	205.0	190.2	100.6%	57.9%
Illinois / Mississippi River Confluence	153.6	148.9	13.3%	40.0%
Overall	187.3	176.0	70.5%	51.7%

[a] To convert kg/ha to lbs/ac, multiple by 0.8922.

Table 15. Foods consumed by lesser scaup (n = 42) during spring migration 2014 in the Illinois River valley from Grafton to Hennepin, IL. Foods making up less than 0.1% aggregate mass or less than 10% percent occurrence were omitted.

Taxa	Aggregate Percent	Percent Occurrence
Chironomidae (larvae)	11.7%	42.9%
Sphaeriidae	9.7%	33.3%
Cyperus erythrorhizos	9.2%	45.2%
Echinochloa crus-galli	7.4%	19.0%
Cephalanthus occidentalis	6.8%	9.5%
Echinochloa walteri	6.5%	19.0%
Polygonum lapathifolium	5.6%	28.6%
Isopoda	4.4%	9.5%
Potamogeton foliosus	3.8%	4.8%
Polygonum pensylvanicum	3.6%	14.3%
Potamogeton spp.	3.6%	11.9%
Leersia oryzoides	3.3%	21.4%
Physidae	2.4%	23.8%
Glycine max	2.4%	2.4%
Cyperus odoratus	2.3%	47.6%
Insecta	1.7%	4.8%
Planorbidae	1.6%	16.7%
Bivalvia	1.4%	2.4%
Pleuroceridae	1.2%	2.4%
Coenagrionidae	1.1%	4.8%
Hyalella azteca	1.0%	9.5%
Aquatic vegetation (unknown)	1.0%	14.3%
Eleocharis obtusa	1.0%	2.4%
Leptochloa fusca	0.9%	14.3%
Amaranthus spp.	0.5%	47.6%
Panicum spp.	0.2%	14.3%
Amphipoda	0.2%	11.9%
Lymnaeidae	0.2%	11.9%
Plant material (seeds, tubers, vegetative matter)	60.8%	95.2%
Invertebrates	39.2%	90.5%
Vertebrates	0.0%	2.4%

Table 16. Foods consumed by canvasback (n = 11) during spring migration 2014 in the Illinois River valley from Grafton to Hennepin, IL. Foods making up less than 0.1% aggregate mass or less than 10% percent occurrence were omitted.

Taxa	Aggregate Percent	Percent Occurrence
Echinochloa crus-galli	18.9%	27.3%
Unknown tubers	14.2%	18.2%
Cyperus odoratus	10.7%	36.4%
Echinochloa walteri	9.1%	9.1%
Insecta	9.1%	9.1%
Leersia oryzoides	9.1%	9.1%
Potamogeton nodusus	8.4%	27.3%
Animal matter (unidentifiable)	8.1%	9.1%
Cyperus erythrorhizos	5.9%	27.3%
Sphaeriidae	3.3%	9.1%
Potamogeton foliosus	1.2%	9.1%
Polygonum lapathifolium	1.0%	9.1%
Amaranthus spp	0.5%	18.2%
Tubellaria	0.2%	9.1%
Chironomidae	0.2%	9.1%
Plant material (seeds, tubers, vegetative matter)	79.1%	100.0%
Invertebrates	12.8%	36.4%
Vertebrates	8.1%	9.1%

Table 17. Sampling locations of lesser scaup and canvasbacks during spring 2014 along with an index of foraging habitat quality (daily lipid dynamics; DLD), number of samples collected, and densities of seeds and tubers (seeds), invertebrates, and both combined (Overall) that are typically consumed by diving ducks.

Location	DLD	n	Seeds	Invertebrates	Overall
Central Illinois River	**4.7**	**139**	**160.1**	**3.1**	**162.7**
Emiquon National Wildlife Refuge - Wilder Unit	56.7	3	NA	NA	NA
Chain Lake	43.4	12	154.9	0.8	155.7
Moscow Bay	37.6	3	NA	NA	NA
Quiver Creek	14.8	7	NA	NA	NA
Anderson Lake SFWA - Carlson Unit	11.7	5	447.4	6.9	454.3
Merwin Preserve	11.0	1	NA	NA	NA
Worley Lake	10.7	6	637.2	0.8	638.0
Rice Lake SFWA - Big Lake Unit	9.4	7	26.4	2.4	28.8
Babb's Slough	5.5	4	0.5	0.8	1.3
Sue and Wes Dixon Refuge at Hennepin & Hopper	4.7	10	135.4	4.9	140.3
Otter Lake / Cuba Island	3.1	2	NA	NA	NA
Lower Peoria Lake	-0.1	11	NA	NA	NA
Bath Lake	-1.5	10	NA	NA	NA
Emiquon Preserve	-2.3	25	144.8	1.6	146.4
Chautauqua NWR	-5.5	18	160.8	1.1	161.9
Quiver Lake	-13.0	5	NA	NA	NA
Woodford Co. SFWA	-34.8	6	NA	NA	NA
Anderson Lake SFWA	-36.0	1	NA	NA	NA
Illinois/Mississippi River Confluence	**-18.0**	**30**	**97.2**	**4.3**	**101.5**
Swan Lake NWR	-8.8	12	72.0	7.5	79.5
Mississippi River SFWA - Godar Unit	-11.6	3	126.8	3.8	130.5
Mississippi River SFWA - Fowler Lake Unit	-22.2	6	116.6	2.7	119.3
Mississippi River SFWA - Fuller Lake Unit	-25.7	10	73.7	1.4	75.1
Mississippi River Pool 19	**-11.3**	**19**	**29.4**	**181.3**	**210.7**
Dam at Hamilton, IL	27.5	1	NA	NA	NA
Reed's Landing at Nauvoo, IL	-10.0	6	NA	NA	NA
Sheridan to Larry Creeks	-15.2	12	29.4	181.3	210.7

Table 18. Lesser scaup (LESC) and canvasbacks (CANV) captured and banded at Emiquon Preserve and Chautauqua National Wildlife Refuge (NWR) in the Illinois River valley during spring 2014 with mean stopover duration (days).

Species	Sex	*n*	Location	Dates	Recaptures	
					n	Days
LESC	Male	1670	Emiquon Preserve	13 Mar–14 Apr	178	7.3
	Female	264	Emiquon Preserve	13 Mar–14 Apr	30	6.1
	Male	440	Chautauqua NWR	24 Mar–14 Apr	196	7.7
	Female	114	Chautauqua NWR	24 Mar–14 Apr	59	6.5
	Total	**2,488**			**463**	**7.3**
CANV	Male	3	Emiquon Preserve	13–14 Mar	1	---
	Total	**3**				

Table 19. Current status of bald eagle (*Haliaeetus leucocephalus*) nests and wading bird colonies (great blue heron [*Ardea herodias*] and great egret [*A. alba*]) in Illinois and along the shoreline of the Mississippi, Ohio, and Wabash rivers adjacent to Illinois, springs[a] 2012–2014.

Species/group	Active	Not found[b]	Not used	Average nests/colony
Bald eagle nests	263[c]	108	63	-
Wading bird colony	126	103	-	82.3

[a] Aerial surveys were flown on 6, 11, 12, 18, 24, and 26 April, and 8 May 2012 and 6, 7, 11, and 28 March 2014.

[b] Waypoints identified in the IDNR geospatial database of colonial wading bird colonies and bald eagle nests that were not located during either springs 2012 and 2014. These colony and nest locations are no longer present in Illinois.

[c] One bald eagle nest could not be aerially inventoried due its proximity to a nuclear power plant; therefore, we documented its status via ground observation.

Table 20. Descriptions and preliminary estimates of sandhill crane vital rates generated using known-fate and multi-state models incorporating live-dead recovery data in Program MARK v.8.0.

PARAMETER		DESCRIPTION	ESTIMATE	S.E.
NEST PRODUCTIVITY		PROBABILITIY OF NESTS SUCCESSFULLY FLEDGING YOUNG	16%	3.05%
JUVENILE SURVIVAL		SURVIVORSHIP FROM FLEDGING TO ADULT (≈1 YEAR OLD)	43%	7.70%
ANNUAL ADULT SURVIVAL	NON-BREEDING	ANNUAL SURVIVAL OF NON-BREEDING ADULTS	96%	3.77%
	BREEDING	ANNUAL SURVIVAL OF BREEDING ADULTS	97%	2.74%

Submitted by:

Heath M. Hagy, Ph.D., AWB
Director, Forbes Biological Station
Illinois Natural History Survey

Date: 30 August 2014

Appendix 1. 2013 Fall Waterfowl Inventories of the Upper and Lower Divisions of the Illinois and Central Mississippi Rivers by Date and Location

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 09/03/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO	DCCO
Hennepin/Hopper	0	0	500	2,100	0	0	0	0	0	0	0	0	0	0	0	0	0	2,600	80	0	0	0	600	10
Goose Lake	160	0	215	4,065	1,300	0	0	320	0	0	0	0	0	0	0	0	0	6,060	230	0	0	75	0	0
Senachwine Lake	80	0	10	1,120	100	0	0	10	0	0	0	0	0	0	0	0	0	1,320	10	0	0	2,560	0	0
Hitchcock Slough	0	0	0	500	150	0	0	150	0	0	0	0	0	0	0	0	0	800	0	0	0	0	0	0
Douglas Lake	0	0	0	35	50	0	0	10	0	0	0	0	0	0	0	0	0	95	100	0	0	0	0	0
Goose Lake	10	0	10	0	0	0	0	50	0	0	0	0	0	0	0	0	0	70	0	0	0	800	0	0
Upper Peoria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	10
TOTAL UPPER	250	0	735	7,820	1,600	0	0	540	0	0	0	0	0	0	0	0	0	10,945	470	0	0	3,435	600	20

LOWER ILLINOIS RIVER VALLEY

Goose Lake	45	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	0	10	0	0
Rice Lake	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	635	0	5
Big Lake	60	0	15	150	25	0	0	25	0	0	0	0	0	0	0	0	0	275	0	0	0	1,010	0	0
Banner Marsh	40	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	240	10	0	0	80	0	0
Duck Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Clear Lake	200	0	200	1,500	550	0	0	300	0	0	0	0	0	0	0	0	0	2,750	155	0	0	900	0	0
Chautauqua	505	0	350	6,500	2,500	0	0	1,000	0	0	0	0	0	0	0	0	0	10,855	70	0	0	805	0	10
Emiquon/Spoon Btm	705	0	1,950	3,180	640	0	0	1,310	0	0	0	0	0	0	0	0	0	7,785	95	0	0	515	1,285	400
Grass Lake	100	0	200	900	200	0	0	400	0	0	0	0	0	0	0	0	0	1,800	0	0	0	2,510	0	0
Jack Lake	200	0	200	2,000	700	0	0	400	0	0	0	0	0	0	0	0	0	3,500	0	0	0	1,500	0	10
Stewart Lake	10	0	10	25	10	0	0	25	0	0	0	0	0	0	0	0	0	80	50	0	0	210	0	0
Crane Lake	10	0	5	20	0	0	0	5	0	0	0	0	0	0	0	0	0	40	5	0	0	5	0	0
Cuba Island	0	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	0	10	0	0
Big Lake	5	0	5	10	0	0	0	20	0	0	0	0	0	0	0	0	0	40	0	0	0	25	0	5
Spunky Bottoms	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	900	0	0
Meredosia Lake	0	0	0	35	5	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	2,525	0	0
TOTAL LOWER	1,890	0	2,935	14,735	4,630	0	0	3,485	0	0	0	0	0	0	0	0	0	27,675	385	0	0	11,640	1,285	530
TOTAL ILLINOIS	2,140	0	3,670	22,555	6,230	0	0	4,025	0	0	0	0	0	0	0	0	0	38,620	855	0	0	15,075	1,885	550
10-Year Average 2003-2012	2,406	0	934	14,917	4,771	4	6	1,031	0	0	0	0	0	0	0	0	0	24,068	696	0	0	8,622	483	

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 09/03/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO	DCCO
Keokuk-Nauvoo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Arthur Refuge	25	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	105	20	0	0	45	0	0
Nauvoo-Ft. Madison	10	0	0	220	0	0	0	0	0	0	0	0	0	0	0	0	0	230	65	0	0	0	0	40
Ft. Madison-Dallas	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	125	0	0	0	0	0
Keithsburg Refuge	5	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	15	30	0	0	0	0	5
Louisa Refuge	0	0	10	50	0	0	0	10	0	0	0	0	0	0	0	0	0	70	0	0	0	540	0	10
TOTAL UPPER	50	0	10	360	0	0	0	10	0	0	0	0	0	0	0	0	0	430	240	0	0	585	0	65
LOWER MISSISSIPPI RIVER VALLEY																								
Swan Lake	200	0	500	3,200	505	0	0	300	0	0	0	0	0	0	0	0	0	4,705	50	0	0	965	0	0
Gilbert Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	25
Long Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dardenne Club	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cuivre Club	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Batchtown Refuge	5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	10	50	0	0	0	0	0
Cannon Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delair Refuge	20	0	25	50	50	0	0	0	0	0	0	0	0	0	0	0	0	145	25	0	0	0	0	0
Shanks Refuge	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	20	0	0	500	0	0
Meyer-Keokuk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	5
TOTAL LOWER	230	0	525	3,250	560	0	0	305	0	0	0	0	0	0	0	0	0	4,870	225	0	0	1,465	0	30
TOTAL MISSISSIPPI	280	0	535	3,610	560	0	0	315	0	0	0	0	0	0	0	0	0	5,300	465	0	0	2,050	0	95
10-Year Average 2003-2012	518	0	34	4,331	802	0	0	68	0	0	0	0	0	0	0	0	0	5,753	605	0	0	2,584	11	

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 09/13/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	100	0	300	1,000	500	0	0	200	0	0	0	0	0	0	0	0	0	2,100	35	0	0	25	1,000
Goose Lake	200	0	300	5,000	3,000	0	0	600	0	0	0	0	0	0	0	0	0	9,100	250	0	0	0	0
Senachwine Lake	205	0	260	1,000	700	0	0	400	0	0	0	0	0	0	0	0	0	2,565	0	0	0	605	0
Hitchcock Slough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	0
Douglas Lake	50	0	0	200	800	0	0	100	0	0	0	0	0	0	0	0	0	1,150	0	0	0	100	0
Goose Lake	0	0	0	0	0	0	0	150	0	0	0	0	0	0	0	0	0	150	10	0	0	1,200	0
Upper Peoria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	0
TOTAL UPPER	555	0	860	7,200	5,000	0	0	1,450	0	0	0	0	0	0	0	0	0	15,065	295	0	0	2,730	1,000

LOWER ILLINOIS RIVER VALLEY

Goose Lake	0	0	0	425	300	0	0	0	0	0	0	0	0	0	0	0	0	725	0	0	0	600	0
Rice Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,700	0
Big Lake	20	0	30	315	200	0	0	10	0	0	0	0	0	0	0	0	0	575	0	0	0	1,300	5
Banner Marsh	10	0	0	30	50	0	0	0	0	0	0	0	0	0	0	0	0	90	20	0	0	10	0
Duck Creek	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
Clear Lake	250	0	210	1,600	1,010	0	0	0	0	0	0	0	0	0	0	0	0	3,070	15	0	0	1,600	0
Chautauqua	465	0	400	1,500	3,000	0	0	500	0	0	0	0	0	0	0	0	0	5,865	25	0	0	10	0
Emiquon/Spoon Btm	990	0	1,725	3,485	1,730	0	0	1,785	0	0	0	0	0	0	0	0	0	9,715	185	0	0	700	4,315
Grass Lake	160	0	100	1,150	750	0	0	400	0	0	0	0	0	0	0	0	0	2,560	45	0	0	0	0
Jack Lake	60	0	60	470	150	0	0	200	0	0	0	0	0	0	0	0	0	940	35	0	0	500	0
Stewart Lake	110	0	205	855	300	0	0	245	0	0	0	0	0	0	0	0	0	1,715	45	0	0	1,350	0
Crane Lake	0	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	10	10	0	0	5	0
Cuba Island	25	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	0	125	60	0	0	10	0
Big Lake	25	0	10	150	50	0	0	25	0	0	0	0	0	0	0	0	0	260	0	0	0	0	0
Spunky Bottoms	0	0	0	10	0	0	0	10	0	0	0	0	0	0	0	0	0	20	20	0	0	180	0
Meredosia Lake	0	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	865	0
TOTAL LOWER	2,130	0	2,745	10,050	7,600	0	0	3,180	0	0	0	0	0	0	0	0	0	25,705	460	0	0	8,830	4,330
TOTAL ILLINOIS	2,685	0	3,605	17,250	12,600	0	0	4,630	0	0	0	0	0	0	0	0	0	40,770	755	0	0	11,560	5,330
10-Year Average 2003-2012	3,939	0	2,254	15,879	7,126	97	516	1,379	0	0	0	0	0	0	0	0	0	31,190	857	0	0	12,048	2,236

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 09/13/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	15	0
Arthur Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	0	0	35	0
Nauvoo-Ft. Madison	0	0	0	700	0	0	0	0	0	0	0	0	0	0	0	0	0	700	50	0	0	35	10
Ft. Madison-Dallas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0	0	0
Keithsburg Refuge	10	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	20	50	0	0	2,000	0
Louisa Refuge	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	60	0	0	600	0
TOTAL UPPER	25	0	0	700	0	0	0	10	0	0	0	0	0	0	0	0	0	735	335	0	0	2,685	10

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	200	0	500	4,010	2,000	0	0	1,000	0	0	0	0	0	0	0	0	0	7,710	180	0	0	850	0
Gilbert Lake	0	0	0	25	25	0	0	0	0	0	0	0	0	0	0	0	0	50	70	0	0	0	0
Long Lake	0	0	0	5	10	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
Dardenne Club	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Cuivre Club	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batchtown Refuge	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20	35	0	0	0	0
Cannon Refuge	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	30	0
Delair Refuge	25	0	25	150	100	0	0	25	0	0	0	0	0	0	0	0	0	325	15	0	0	0	0
Shanks Refuge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meyer-Keokuk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	10	0
TOTAL LOWER	225	0	525	4,220	2,135	0	0	1,025	0	0	0	0	0	0	0	0	0	8,130	340	0	0	890	0
TOTAL MISSISSIPPI	250	0	525	4,920	2,135	0	0	1,035	0	0	0	0	0	0	0	0	0	8,865	675	0	0	3,575	10
10-Year Average 2003-2012	984	0	523	4,372	2,568	64	44	246	0	0	0	0	0	0	0	0	0	8,800	911	0	0	3,226	72

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 09/25/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	0	0	10	100	0	5	0	60	0	0	0	0	0	0	0	0	0	175	135	0	0	55	4,500
Goose Lake	900	0	700	4,200	5,600	0	0	2,800	0	0	0	0	0	0	0	0	0	14,200	55	0	0	400	0
Senachwine Lake	305	0	1,450	600	1,700	0	0	600	0	0	0	0	0	0	0	0	0	4,655	0	0	0	3,000	0
Hitchcock Slough	10	0	0	0	0	0	0	200	0	0	0	0	0	0	0	0	0	210	0	0	0	0	0
Douglas Lake	10	0	0	100	0	0	0	20	0	0	0	0	0	0	0	0	0	130	5	0	0	0	0
Goose Lake	50	0	100	100	425	0	0	50	0	0	0	0	0	0	0	0	0	725	125	0	0	1,250	0
Upper Peoria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL UPPER	1,275	0	2,260	5,100	7,725	5	0	3,730	0	0	0	0	0	0	0	0	0	20,095	320	0	0	4,705	4,500

LOWER ILLINOIS RIVER VALLEY

Goose Lake	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	300	0
Rice Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	3,430	0
Big Lake	50	0	25	400	300	0	0	250	0	0	0	0	0	0	0	0	0	1,025	20	0	0	3,200	0
Banner Marsh	10	0	0	125	0	0	0	0	0	0	0	0	0	0	0	0	0	135	100	0	0	25	0
Duck Creek	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Clear Lake	650	0	500	2,400	1,400	0	0	600	0	0	0	0	0	0	0	0	0	5,550	25	0	0	5	0
Chautauqua	3,200	0	2,400	6,550	9,200	0	0	1,220	0	0	0	0	0	0	0	0	0	22,570	175	0	0	0	0
Emiquon/Spoon Btm	1,660	0	11,055	8,155	5,470	270	1,075	4,075	0	0	0	0	0	0	0	0	0	31,760	285	0	0	815	25,240
Grass Lake	25	0	125	775	200	0	0	400	0	0	0	0	0	0	0	0	0	1,525	10	0	0	10	0
Jack Lake	50	0	600	300	50	0	0	200	0	0	0	0	0	0	0	0	0	1,200	0	0	0	250	0
Stewart Lake	100	0	850	500	1,500	0	0	200	0	0	0	0	0	0	0	0	0	3,150	0	0	0	100	0
Crane Lake	10	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	20	0	0	0	340	0
Cuba Island	100	0	1,000	150	250	0	0	100	0	0	0	0	0	0	0	0	0	1,600	220	0	0	0	0
Big Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	700	0
Spunky Bottoms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	610	0	0	400	0
Meredosia Lake	10	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	40	5	0	0	730	0
TOTAL LOWER	5,865	0	16,555	19,355	18,500	270	1,075	7,055	0	0	0	0	0	0	0	0	0	68,675	1,465	0	0	10,310	25,240
TOTAL ILLINOIS	7,140	0	18,815	24,455	26,225	275	1,075	10,785	0	0	0	0	0	0	0	0	0	88,770	1,785	0	0	15,015	29,740
10-Year Average 2003-2012	6,685	0	12,922	11,208	17,292	160	240	6,287	0	0	0	0	0	0	0	0	0	54,793	1,110	0	0	6,907	17,952

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 09/25/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	20	0
Arthur Refuge	10	0	0	300	100	0	0	0	0	0	0	0	0	0	0	0	0	410	250	0	0	100	0
Nauvoo-Ft. Madison	100	0	0	50	0	0	0	5	0	0	0	0	0	0	0	0	0	155	20	0	0	30	0
Ft. Madison-Dallas	0	0	0	20	5	0	0	0	0	0	0	0	0	0	0	0	0	25	70	0	0	135	0
Keithsburg Refuge	30	0	0	0	110	0	0	15	0	0	0	0	0	0	0	0	0	155	630	0	0	50	0
Louisa Refuge	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	650	0	5	0	0
TOTAL UPPER	150	0	0	370	215	0	0	20	0	0	0	0	0	0	0	0	0	755	1,650	0	5	335	0

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	225	0	3,700	2,825	1,550	10	100	700	0	0	0	0	0	0	0	0	0	9,110	780	0	0	1,885	0
Gilbert Lake	25	0	400	200	50	0	0	100	0	0	0	0	0	0	0	0	0	775	0	0	0	0	0
Long Lake	0	0	0	100	50	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	0	0	0
Dardenne Club	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	0	0	0	0
Cuivre Club	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Batchtown Refuge	0	0	25	50	100	0	0	0	0	0	0	0	0	0	0	0	0	175	250	0	0	0	0
Cannon Refuge	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Delair Refuge	10	0	50	0	200	0	5	50	0	0	0	0	0	0	0	0	0	315	40	0	0	0	0
Shanks Refuge	10	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	110	0	0	0	0	0
Meyer-Keokuk	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	30	0	0	100	0
TOTAL LOWER	275	0	4,175	3,285	1,950	10	105	855	0	0	0	0	0	0	0	0	0	10,655	1,105	0	0	1,985	0
TOTAL MISSISSIPPI	425	0	4,175	3,655	2,165	10	105	875	0	0	0	0	0	0	0	0	0	11,410	2,755	0	5	2,320	0
10-Year Average 2003-2012	1,861	0	3,020	1,335	4,243	103	609	508	0	0	0	0	0	0	0	0	0	11,678	1,445	0	0	2,010	1,353

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 10/14/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	700	0	2,625	1,050	1,750	1,750	1,750	2,625	0	0	0	0	0	0	0	0	0	12,250	775	0	0	50	22,750
Goose Lake	200	0	1,000	600	3,000	0	0	1,510	0	0	0	0	0	0	0	0	0	6,310	415	0	0	0	100
Senachwine Lake	800	50	2,500	100	700	0	10	1,000	0	0	0	0	0	0	0	0	0	5,160	0	0	0	25	0
Hitchcock Slough	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0	0	0
Douglas Lake	2,010	0	9,100	100	1,500	400	1,200	1,500	0	0	0	0	0	0	0	0	0	15,810	50	0	0	0	6,000
Goose Lake	1,000	0	10,000	0	0	0	0	500	0	0	0	0	0	0	0	0	0	11,500	310	0	0	1,000	0
Upper Peoria	2,000	0	0	0	0	0	0	0	0	0	0	0	1,050	0	0	0	0	3,050	0	0	0	850	10
TOTAL UPPER	6,720	50	25,225	1,850	6,950	2,150	2,960	7,135	0	0	0	0	1,050	0	0	0	0	54,090	1,555	0	0	1,925	28,860
LOWER ILLINOIS RIVER VALLEY																							
Goose Lake	100	0	1,600	500	4,500	0	100	100	0	0	0	0	0	0	0	0	0	6,900	50	0	0	0	50
Rice Lake	100	0	0	0	0	0	0	50	0	0	0	0	50	0	0	0	0	200	0	0	0	800	0
Big Lake	100	0	100	100	700	0	200	400	0	0	0	0	0	0	0	0	0	1,600	25	0	0	800	0
Banner Marsh	30	0	0	25	105	0	0	0	0	0	0	0	0	0	0	0	0	160	170	0	0	150	0
Duck Creek	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	10	25	0	0	5	0
Clear Lake	250	0	200	150	2,025	0	1,100	310	0	0	0	0	300	0	0	0	0	4,335	110	0	0	0	600
Chautauqua	1,900	0	4,600	1,500	16,100	100	600	2,650	0	0	0	0	0	0	0	0	0	27,450	140	0	0	15	500
Emiquon/Spoon Btm	3,285	0	11,660	3,260	8,150	4,890	11,410	11,420	0	0	0	0	95	0	0	0	0	54,170	190	0	0	770	108,395
Grass Lake	100	0	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	300	110	0	0	0	0
Jack Lake	105	0	6,000	100	4,000	0	0	500	0	0	0	0	200	0	0	0	0	10,905	150	0	0	0	2,200
Stewart Lake	100	0	400	0	3,100	0	100	500	0	0	0	0	0	0	0	0	0	4,200	65	0	0	1,100	200
Crane Lake	20	0	200	0	200	0	0	0	0	0	0	0	100	0	0	0	0	520	90	0	0	25	1,500
Cuba Island	35	0	510	0	10	0	0	0	0	0	0	0	0	0	0	0	0	555	335	0	0	0	0
Big Lake	100	0	1,900	0	0	0	200	0	0	0	0	0	0	0	0	0	0	2,200	0	0	0	0	200
Spunky Bottoms	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	100	0	0	600	0
Meredosia Lake	120	0	50	0	25	0	50	300	0	25	0	0	200	0	0	0	0	770	250	0	0	20	500
TOTAL LOWER	6,355	0	27,220	5,635	39,115	4,995	13,765	16,230	0	25	0	0	945	0	0	0	0	114,285	1,810	0	0	4,285	114,145
TOTAL ILLINOIS	13,075	50	52,445	7,485	46,065	7,145	16,725	23,365	0	25	0	0	1,995	0	0	0	0	168,375	3,365	0	0	6,210	143,005
10-Year Average 2003-2012	26,821	197	18,696	1,551	21,370	3,084	9,278	7,239	3	983	17	13	2,670	0	0	0	0	91,921	2,411	21	0	2,770	52,407

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 10/14/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	0	0	10	0	0	0	0	0	0	25	5	0	25	0	0	0	0	65	25	0	0	0	800
Arthur Refuge	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	30	0	0	20	200
Nauvoo-Ft. Madison	75	0	300	1,000	1,400	0	50	125	0	0	0	0	0	0	0	0	0	2,950	30	0	0	35	2,225
Ft. Madison-Dallas	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	290	0	0	50	0
Keithsburg Refuge	0	0	10	0	150	25	50	0	0	0	0	0	0	0	0	0	0	235	500	0	0	0	1,000
Louisa Refuge	100	0	1,000	0	200	0	0	0	0	0	0	0	0	0	0	0	0	1,300	735	0	0	30	0
TOTAL UPPER	175	0	1,380	1,000	1,750	25	100	125	0	25	5	0	25	0	0	0	0	4,610	1,610	0	0	135	4,225

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	970	0	5,700	300	9,500	500	1,900	1,050	0	200	0	0	500	0	0	0	0	20,620	925	10	0	1,250	4,700
Gilbert Lake	35	0	50	0	300	0	0	200	0	0	0	0	0	0	0	0	0	585	10	0	0	0	0
Long Lake	110	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	310	0	0	0	0	0
Dardenne Club	2,000	0	38,500	1,000	4,000	500	2,000	2,000	0	0	0	0	0	0	0	0	0	50,000	0	0	0	0	1,200
Cuivre Club	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
Batchtown Refuge	10	0	25	0	10	0	0	0	0	0	0	0	0	0	0	0	0	45	435	0	0	0	0
Cannon Refuge	35	0	400	0	200	0	0	50	0	0	0	0	0	0	0	0	0	685	0	0	0	0	0
Delair Refuge	100	0	200	0	300	5	0	0	0	0	0	0	0	0	0	0	0	605	510	0	0	0	0
Shanks Refuge	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0
Meyer-Keokuk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	355	0
TOTAL LOWER	3,410	0	45,075	1,300	14,310	1,005	3,900	3,300	0	200	0	0	500	0	0	0	0	73,000	1,905	10	0	1,605	5,900
TOTAL MISSISSIPPI	3,585	0	46,455	2,300	16,060	1,030	4,000	3,425	0	225	5	0	525	0	0	0	0	77,610	3,515	10	0	1,740	10,125
10-Year Average 2003-2012	14,871	3	16,689	291	16,554	2,034	5,990	3,473	0	1,826	0	0	1,733	0	0	0	0	63,463	2,339	73	0	1,766	19,077

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 10/23/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	4,600	0	13,800	0	1,840	2,075	13,800	4,600	100	2,075	50	50	100	0	0	0	50	43,140	100	0	0	30	48,760
Goose Lake	350	5	0	0	7,100	0	200	2,815	0	100	0	0	0	0	0	0	0	10,570	40	0	0	5	640
Senachwine Lake	2,055	50	3,000	0	3,700	0	600	6,000	0	100	0	0	0	0	0	0	0	15,505	0	0	0	5	700
Hitchcock Slough	100	0	100	0	100	0	0	100	0	0	0	0	0	0	0	0	0	400	30	0	0	0	0
Douglas Lake	3,000	0	19,200	0	9,000	1,800	6,000	6,000	0	0	0	0	0	0	0	0	0	45,000	0	0	0	0	15,000
Goose Lake	700	50	200	0	200	0	0	1,000	0	0	0	0	0	0	0	0	0	2,150	10	0	0	500	0
Upper Peoria	5,300	50	0	0	0	0	0	200	0	0	0	0	400	0	0	0	0	5,950	0	0	0	105	810
TOTAL UPPER	16,105	155	36,300	0	21,940	3,875	20,600	20,715	100	2,275	50	50	500	0	0	0	50	122,715	180	0	0	645	65,910

LOWER ILLINOIS RIVER VALLEY

Goose Lake	1,200	0	600	50	100	0	100	0	0	0	0	0	0	0	0	0	0	2,050	225	0	0	0	50
Rice Lake	1,150	0	0	0	0	0	0	0	0	50	0	0	2,100	0	0	0	0	3,300	20	0	0	10	150
Big Lake	560	0	1,000	0	775	0	250	810	10	0	10	0	510	0	0	0	0	3,925	45	0	0	5	1,000
Banner Marsh	50	0	0	0	50	0	0	100	0	0	0	0	50	0	0	0	0	250	275	0	0	0	0
Duck Creek	0	0	200	0	50	0	50	0	0	0	0	0	0	0	0	0	0	300	0	0	0	0	0
Clear Lake	600	0	1,000	1,000	1,000	0	100	1,000	0	0	0	0	600	0	0	0	0	5,300	75	0	0	5	4,000
Chautauqua	17,800	0	34,265	2,410	17,625	2,265	11,150	6,475	0	0	0	0	1,000	0	0	0	0	92,990	1,000	0	0	0	6,510
Emiquon/Spoon Btm	3,600	0	18,300	3,600	12,600	3,600	14,410	9,000	0	500	0	0	1,000	0	0	0	10	66,620	205	0	0	440	113,400
Grass Lake	200	0	150	0	0	0	300	250	0	0	0	0	750	0	0	0	0	1,650	10	0	0	0	1,600
Jack Lake	4,500	0	13,500	450	11,250	450	12,250	2,250	0	1,350	0	0	0	0	0	0	0	46,000	0	0	0	0	7,500
Stewart Lake	100	0	50	0	3,500	0	0	2,375	0	0	0	0	1,000	0	0	0	0	7,025	0	0	0	5	200
Crane Lake	200	0	100	0	100	0	200	0	0	50	0	0	350	0	0	0	0	1,000	200	0	0	250	4,150
Cuba Island	710	0	1,600	100	700	25	800	150	0	0	0	0	0	0	0	0	0	4,085	150	0	0	0	1,200
Big Lake	25	0	1,610	0	1,250	0	0	200	0	0	0	0	0	0	0	0	0	3,085	25	0	0	0	0
Spunky Bottoms	5	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	105	0	0	0	5	0
Meredosia Lake	60	0	0	0	50	0	0	150	0	0	0	0	200	0	0	0	0	460	0	0	0	130	200
TOTAL LOWER	30,760	0	72,375	7,610	49,150	6,340	39,610	22,760	10	1,950	10	0	7,560	0	0	0	10	238,145	2,230	0	0	850	139,960
TOTAL ILLINOIS	46,865	155	108,675	7,610	71,090	10,215	60,210	43,475	110	4,225	60	50	8,060	0	0	0	60	360,860	2,410	0	0	1,495	205,870
10-Year Average 2003-2012	51,013	749	24,170	849	24,175	4,909	14,739	8,947	251	1,588	47	44	3,479	0	0	0	1	134,962	2,376	17	22	1,619	55,982

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 10/23/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	0	0	0	0	0	0	50	0	0	1,900	0	0	7,100	0	0	0	0	9,050	0	0	0	0	0
Arthur Refuge	375	0	0	0	500	0	0	150	0	0	0	0	0	0	0	0	0	1,025	25	0	0	5	0
Nauvoo-Ft. Madison	80	0	100	0	2,000	0	100	100	0	0	0	0	0	0	0	0	0	2,380	45	0	0	0	17,100
Ft. Madison-Dallas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	320	0	0	10	725
Keithsburg Refuge	120	0	0	0	410	0	560	360	0	0	0	0	0	0	0	0	0	1,450	150	0	0	25	0
Louisa Refuge	3,510	0	3,900	0	2,600	390	1,950	650	0	0	0	0	0	0	0	0	0	13,000	1,700	0	0	700	1,000
TOTAL UPPER	4,085	0	4,000	0	5,510	390	2,660	1,260	0	1,900	0	0	7,100	0	0	0	0	26,905	2,240	0	0	740	18,825

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	1,450	0	14,500	725	2,900	725	5,800	2,900	0	1,000	0	0	300	0	0	0	0	30,300	770	10	0	110	3,500
Gilbert Lake	25	0	0	0	0	0	0	400	0	0	0	0	0	0	0	0	0	425	100	0	0	0	0
Long Lake	200	0	500	0	1,000	0	200	200	0	100	0	0	0	0	0	0	0	2,200	0	0	0	0	0
Dardenne Club	2,500	0	36,000	0	4,000	0	6,000	2,000	0	0	0	0	0	0	0	0	0	50,500	0	0	0	0	1,000
Cuivre Club	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	10
Batchtown Refuge	500	0	300	200	5,000	0	100	200	0	0	0	0	0	0	0	0	0	6,300	350	0	0	0	0
Cannon Refuge	1,000	0	3,000	0	4,050	0	500	500	0	0	0	0	0	0	0	0	0	9,050	0	0	0	0	0
Delair Refuge	100	0	100	400	3,500	0	300	500	0	0	0	0	0	0	0	0	0	4,900	350	0	0	0	0
Shanks Refuge	1,130	0	0	0	0	0	100	20	0	0	0	0	0	0	0	0	0	1,250	5	0	0	0	300
Meyer-Keokuk	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	155	0
TOTAL LOWER	7,055	0	54,400	1,325	20,450	725	13,000	6,720	0	1,100	0	0	300	0	0	0	0	105,075	1,575	10	0	265	4,810
TOTAL MISSISSIPPI	11,140	0	58,400	1,325	25,960	1,115	15,660	7,980	0	3,000	0	0	7,400	0	0	0	0	131,980	3,815	10	0	1,005	23,635
10-Year Average 2003-2012	32,626	20	23,058	496	19,035	3,408	11,838	2,173	588	3,011	275	19	2,910	0	6	0	1	99,464	2,689	86	4	1,118	20,286

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 10/28/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	11,600	0	11,600	0	5,800	4,640	23,200	3,480	0	3,480	1,160	100	4,640	0	0	0	0	69,700	600	0	0	0	46,400
Goose Lake	10,200	10	3,000	0	8,000	0	0	5,300	0	100	0	0	0	0	0	0	0	26,610	50	0	0	0	500
Senachwine Lake	17,200	200	1,500	0	200	0	0	3,000	0	0	0	0	3,000	0	0	0	0	25,100	0	0	0	0	2,300
Hitchcock Slough	200	0	0	0	0	0	0	2,000	0	0	0	0	0	0	0	0	0	2,200	0	0	0	0	0
Douglas Lake	17,920	0	11,200	0	8,600	1,120	8,400	2,800	0	560	0	0	0	0	0	0	0	50,600	0	0	0	0	10,900
Goose Lake	14,000	300	4,000	0	0	0	0	0	0	100	0	0	6,000	0	0	0	0	24,400	100	0	0	500	0
Upper Peoria	3,100	0	0	0	0	0	100	0	0	0	0	0	8,600	0	0	0	0	11,800	100	0	0	20	3,000
TOTAL UPPER	74,220	510	31,300	0	22,600	5,760	31,700	16,580	0	4,240	1,160	100	22,240	0	0	0	0	210,410	850	0	0	520	63,100

LOWER ILLINOIS RIVER VALLEY

Goose Lake	5	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	55	0	0	0	0	2,400
Rice Lake	0	0	0	0	0	0	0	0	0	0	0	0	805	0	0	0	0	805	0	0	0	0	0
Big Lake	2,005	0	500	0	1,500	0	0	1,250	0	300	0	0	2,000	0	0	0	0	7,555	0	0	0	0	6,700
Banner Marsh	100	0	0	0	0	0	50	25	0	0	0	0	0	0	0	0	0	175	205	0	0	0	105
Duck Creek	1,250	0	250	0	0	0	250	10	0	0	0	0	0	0	0	0	0	1,760	205	0	0	0	0
Clear Lake	8,000	0	2,000	0	500	0	2,000	500	0	1,000	0	0	3,000	0	0	0	0	17,000	150	0	0	0	3,100
Chautauqua	13,200	100	45,900	1,770	37,830	1,740	13,350	11,610	0	0	0	0	0	0	0	0	0	125,500	750	0	0	25	14,600
Emiquon/Spoon Btm	12,230	0	26,490	2,030	10,160	4,060	36,540	10,150	150	2,500	700	0	2,625	0	0	0	10	107,645	530	25	0	235	101,500
Grass Lake	100	0	0	0	200	0	1,500	200	0	0	0	0	400	0	0	0	0	2,400	0	0	0	0	3,000
Jack Lake	17,500	0	28,000	0	3,500	2,100	7,000	1,400	0	7,000	0	0	3,000	0	0	0	0	69,500	0	0	0	0	8,500
Stewart Lake	200	0	100	0	11,000	0	2,010	4,400	0	0	0	0	500	0	0	0	0	18,210	0	0	0	100	200
Crane Lake	1,500	0	200	0	100	300	8,000	1,000	0	3,000	0	0	50	0	0	0	0	14,150	210	0	0	1,000	3,500
Cuba Island	1,100	0	6,100	0	0	200	1,100	200	0	300	0	0	0	0	0	0	0	9,000	600	0	0	0	2,000
Big Lake	300	0	1,000	0	4,000	0	500	500	0	0	0	0	0	0	0	0	0	6,300	0	0	0	0	1,000
Spunky Bottoms	5	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	55	5	0	0	0	0
Meredosia Lake	2,500	0	0	0	0	0	1,500	225	0	200	0	0	300	0	0	0	0	4,725	0	0	0	0	3,200
TOTAL LOWER	59,995	100	110,540	3,800	68,840	8,400	73,800	31,520	150	14,300	700	0	12,680	0	0	0	10	384,835	2,655	25	0	1,360	149,805
TOTAL ILLINOIS	134,215	610	141,840	3,800	91,440	14,160	105,500	48,100	150	18,540	1,860	100	34,920	0	0	0	10	595,245	3,505	25	0	1,880	212,905
10-Year Average 2003-2012	85,426	1,212	33,613	55	29,780	3,992	26,034	5,161	567	5,487	655	134	6,377	0	10	0	1	198,500	3,089	70	123	1,192	59,980

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 10/28/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	50	0	0	0	0	0	300	0	10,200	1,350	500	10	13,500	0	0	0	0	25,910	0	0	0	0	10,300
Arthur Refuge	0	0	150	0	200	0	0	100	0	0	0	0	100	0	0	0	0	550	310	0	0	5	1,850
Nauvoo-Ft. Madison	210	0	0	25	4,025	0	50	325	0	0	0	0	305	0	0	0	0	4,940	5	0	0	30	16,400
Ft. Madison-Dallas	0	0	0	0	0	0	100	45	0	50	0	0	0	0	0	0	0	195	250	0	0	40	2,310
Keithsburg Refuge	635	0	75	0	475	0	150	950	0	0	0	0	0	0	0	0	0	2,285	675	0	0	0	100
Louisa Refuge	4,480	0	420	0	4,200	0	3,310	900	0	1,700	0	0	0	0	0	0	0	15,010	1,300	0	0	1,200	1,700
TOTAL UPPER	5,375	0	645	25	8,900	0	3,910	2,320	10,200	3,100	500	10	13,905	0	0	0	0	48,890	2,540	0	0	1,275	32,660

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	3,250	0	26,000	0	19,500	0	9,750	3,250	0	7,025	0	0	1,200	0	0	0	0	69,975	820	25	0	400	8,350
Gilbert Lake	200	0	50	0	100	0	150	1,000	0	0	0	0	0	0	0	0	0	1,500	150	0	0	0	0
Long Lake	1,000	0	3,500	0	500	0	500	500	0	0	0	0	0	0	0	0	0	6,000	0	0	0	0	0
Dardenne Club	3,500	0	26,250	0	1,050	0	3,500	700	0	0	0	0	0	0	0	0	0	35,000	0	0	0	0	5,000
Cuivre Club	1,000	0	2,000	0	0	0	150	0	0	0	0	0	0	0	0	0	0	3,150	0	0	0	0	0
Batchtown Refuge	3,400	0	1,000	0	7,000	0	500	0	0	0	0	0	0	0	0	0	0	11,900	800	0	0	0	0
Cannon Refuge	6,000	0	4,000	0	3,500	0	250	250	0	10	0	0	0	0	0	0	0	14,010	100	0	0	0	0
Delair Refuge	4,500	0	1,800	0	9,200	0	3,600	900	0	0	0	0	0	0	0	0	0	20,000	500	0	0	0	0
Shanks Refuge	1,025	0	0	0	0	0	100	0	0	0	0	0	100	0	0	0	0	1,225	0	0	0	0	3,000
Meyer-Keokuk	0	0	0	0	0	0	0	50	0	100	0	0	260	0	0	0	0	410	10	0	0	120	330
TOTAL LOWER	23,875	0	64,600	0	40,850	0	18,500	6,650	0	7,135	0	0	1,560	0	0	0	0	163,170	2,380	25	0	520	16,680
TOTAL MISSISSIPPI	29,250	0	65,245	25	49,750	0	22,410	8,970	10,200	10,235	500	10	15,465	0	0	0	0	212,060	4,920	25	0	1,795	49,340
10-Year Average 2003-2012	47,357	44	27,167	120	19,748	2,284	17,123	1,582	5,654	7,785	3,445	35	5,250	19	120	0	0	137,731	3,536	85	501	1,112	22,853

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 11/08/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	19,000	100	1,900	0	4,750	2,850	19,000	1,900	50	950	500	100	2,850	0	0	0	0	53,950	1,500	0	0	0	41,800
Goose Lake	39,000	200	3,900	0	23,400	0	7,800	3,900	100	0	0	0	300	0	0	0	0	78,600	25	0	0	15	4,025
Senachwine Lake	17,000	300	1,000	0	4,000	0	0	0	200	0	0	0	2,100	0	0	0	0	24,600	0	0	0	0	0
Hitchcock Slough	22,000	5	1,000	0	12,000	0	4,000	2,000	0	0	0	0	0	0	0	0	0	41,005	0	0	0	0	0
Douglas Lake	21,930	0	5,300	0	2,150	430	4,300	2,150	0	1,290	0	0	50	0	0	0	0	37,600	0	0	0	0	7,550
Goose Lake	23,400	200	1,170	0	5,850	0	3,900	780	0	1,950	0	0	1,950	0	0	0	0	39,200	100	0	0	25	3,300
Upper Peoria	600	0	0	0	200	0	0	0	100	0	0	0	5,400	0	0	0	0	6,300	0	0	0	0	1,200
TOTAL UPPER	142,930	805	14,270	0	52,350	3,280	39,000	10,730	450	4,190	500	100	12,650	0	0	0	0	281,255	1,625	0	0	40	57,875

LOWER ILLINOIS RIVER VALLEY

Goose Lake	5	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	105	0	0	0	0	2,100
Rice Lake	3,500	0	0	0	0	0	0	0	0	0	0	0	330	0	0	0	0	3,830	0	0	0	0	100
Big Lake	2,000	0	0	0	500	0	3,000	1,000	100	4,000	0	0	3,000	0	0	0	0	13,600	0	0	0	0	12,000
Banner Marsh	360	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	380	280	0	0	0	300
Duck Creek	1,475	0	0	0	0	0	250	0	0	0	0	0	0	0	0	0	10	1,735	0	0	0	0	170
Clear Lake	33,000	0	200	0	8,000	0	4,000	2,500	0	0	0	0	1,000	0	0	0	0	48,700	200	0	0	0	3,500
Chautauqua	87,420	500	18,700	0	72,200	4,730	34,650	15,950	0	9,000	1,000	0	2,000	0	0	0	0	246,150	1,600	450	0	0	37,850
Emiquon/Spoon Btm	12,310	0	4,000	0	200	800	19,200	9,210	0	17,110	2,000	0	950	0	100	0	10	65,890	55	0	0	115	28,000
Grass Lake	7,500	0	1,500	0	9,000	0	10,500	1,600	0	700	50	0	1,000	0	0	0	0	31,850	0	0	0	0	7,500
Jack Lake	8,850	200	1,770	0	2,950	1,180	8,850	2,950	100	29,500	100	0	3,000	0	0	0	0	59,450	0	0	0	0	7,950
Stewart Lake	1,500	0	0	0	31,000	0	7,500	3,100	0	0	0	0	100	0	0	0	0	43,200	0	0	0	50	1,500
Crane Lake	3,710	0	0	0	600	0	4,500	1,500	250	20,400	500	0	0	0	0	0	0	31,460	500	0	0	350	4,100
Cuba Island	11,500	0	800	0	200	100	6,700	400	0	0	0	0	0	0	0	0	0	19,700	610	0	0	0	3,200
Big Lake	1,005	0	0	0	100	0	2,000	100	10	200	0	0	0	0	0	0	0	3,415	0	0	0	0	200
Spunky Bottoms	25	0	0	0	20	0	10	20	0	0	0	0	0	0	0	0	0	75	0	0	0	0	0
Meredosia Lake	12,500	0	0	0	2,500	0	6,120	0	110	3,510	0	0	710	0	10	0	0	25,460	0	0	0	0	3,700
TOTAL LOWER	186,660	700	26,970	0	127,270	6,810	107,300	38,330	570	84,420	3,650	0	12,190	0	110	0	20	595,000	3,245	450	0	515	112,170
TOTAL ILLINOIS	329,590	1,505	41,240	0	179,620	10,090	146,300	49,060	1,020	88,610	4,150	100	24,840	0	110	0	20	876,255	4,870	450	0	555	170,045
10-Year Average 2003-2012	99,581	2,951	31,376	7	22,759	4,392	22,139	6,240	979	8,321	1,094	47	4,891	7	97	0	39	204,920	4,521	175	175	393	22,229

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 11/14/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	20	2,550	0	0	0	5,100	1,020	21,420	2,550	1,020	2,550	1,530	255	2,550	0	0	0	0	40,545	2,860	0	0	0	21,400
Goose Lake	50	21,250	5	100	0	6,050	0	250	200	0	0	0	0	0	0	0	0	0	27,855	10	0	0	0	0
Senachwine Lake	10	40,100	250	0	0	0	0	0	0	10	0	0	0	3,020	0	0	0	0	43,380	0	0	0	0	0
Hitchcock Slough	50	10,400	0	5,500	0	8,300	0	6,000	0	0	0	0	0	0	0	0	0	0	30,200	0	0	0	0	0
Douglas Lake	25	24,535	0	2,355	0	1,815	0	1,540	0	0	540	0	0	0	0	0	0	0	30,785	0	0	0	0	815
Goose Lake	5	38,100	250	0	0	800	0	800	0	0	0	0	0	400	0	0	0	0	40,350	0	0	0	5	300
Upper Peoria	5	600	0	0	0	0	0	0	0	0	0	0	0	325	0	0	0	0	925	10	0	0	0	100
TOTAL UPPER		137,535	505	7,955	0	22,065	1,020	30,010	2,750	1,030	3,090	1,530	255	6,295	0	0	0	0	214,040	2,880	0	0	5	22,615

LOWER ILLINOIS RIVER VALLEY

Goose Lake	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Rice Lake	5	6,400	10	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	6,510	0	0	0	0	100
Big Lake	10	5,005	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	5,015	0	0	0	0	110
Banner Marsh	5	300	0	0	0	0	0	300	0	0	0	0	0	0	0	0	0	0	600	470	0	0	0	0
Duck Creek	0	7,915	0	0	0	0	0	6,725	0	0	0	0	0	0	0	0	0	0	14,640	700	0	0	0	0
Clear Lake	0	21,000	0	0	0	7,000	0	5,000	420	0	0	0	0	200	0	0	0	0	33,620	100	0	0	0	0
Chautauqua	30	58,860	0	8,025	0	49,800	0	44,125	6,495	0	0	0	0	0	0	0	0	0	167,305	900	150	0	0	4,495
Emiquon/Spoon Btm	0	995	0	0	0	0	50	2,800	1,310	100	500	755	0	390	0	150	0	210	7,260	0	10	0	20	100
Grass Lake	5	15,000	0	5,000	0	2,000	0	5,000	2,000	0	0	0	0	10	0	0	0	0	29,010	0	0	0	0	5,000
Jack Lake	5	9,000	50	0	0	1,000	0	7,000	1,000	300	25,000	0	0	0	10	0	0	0	43,360	0	0	0	0	9,700
Stewart Lake	5	400	0	0	0	18,000	0	2,100	1,500	0	0	0	0	0	0	0	0	0	22,000	0	0	0	0	0
Crane Lake	5	22,000	150	500	0	0	0	4,000	0	0	7,000	0	0	0	0	0	0	0	33,650	300	0	0	0	0
Cuba Island	25	1,750	0	6,010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,760	550	30	0	0	500
Big Lake	5	100	0	10	0	0	0	0	10	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0
Spunky Bottoms	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Meredosia Lake	0	6,215	0	0	0	1,000	0	2,050	800	100	0	0	0	0	0	0	0	0	10,165	0	0	0	0	25
TOTAL LOWER		154,950	210	19,545	0	78,800	50	79,100	13,545	500	32,500	755	0	700	10	150	0	210	381,025	3,020	190	0	20	20,030
TOTAL ILLINOIS		292,485	715	27,500	0	100,865	1,070	109,110	16,295	1,530	35,590	2,285	255	6,995	10	150	0	210	595,065	5,900	190	0	25	42,645
10-Year Average 2003-2012		127,628	2,780	22,091	0	25,327	3,316	29,127	5,824	1,755	11,771	938	13	7,941	26	130	0	98	238,763	2,925	231	56	531	35,293

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 11/15/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	50	0	0	0	0	0	0	0	37,000	4,000	4,100	0	10,100	0	1,100	0	0	56,350	5	0	0	0	2,820
Arthur Refuge	450	0	0	0	100	0	0	0	0	0	0	0	0	0	300	0	0	850	160	0	0	10	0
Nauvoo-Ft. Madison	10	0	0	0	300	0	0	0	600	0	0	0	1,600	0	1,050	25	0	3,585	5	0	0	0	5,700
Ft. Madison-Dallas	50	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	150	0	0	0	0	0
Keithsburg Refuge	750	0	110	0	385	0	120	600	0	0	0	0	0	0	0	0	0	1,965	775	0	0	0	0
Louisa Refuge	1,235	0	50	0	100	0	2,500	0	0	4,000	0	0	0	0	0	0	0	7,885	680	0	0	60	4,610
TOTAL UPPER	2,545	0	160	0	885	0	2,620	600	37,700	8,000	4,100	0	11,700	0	2,450	25	0	70,785	1,625	0	0	70	13,130

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	35,000	200	21,000	0	28,000	2,800	42,000	7,000	500	20,000	0	0	2,600	0	100	0	10	159,210	600	500	1,000	60	4,800
Gilbert Lake	2,700	15	200	0	300	0	2,200	200	0	0	0	0	0	0	0	0	0	5,615	560	0	0	0	0
Long Lake	22,500	100	500	0	1,000	0	1,000	500	0	5,000	0	0	0	0	0	0	0	30,600	0	0	0	0	0
Dardenne Club	21,100	0	10,000	0	300	0	1,650	1,000	0	0	0	0	0	0	0	0	0	34,050	0	0	0	0	400
Cuivre Club	17,100	0	5,100	0	1,000	0	5,000	0	0	0	0	0	0	0	0	0	0	28,200	0	0	0	0	100
Batchtown Refuge	17,200	200	1,000	0	9,000	200	6,000	1,100	0	1,000	0	0	0	0	0	0	0	35,700	300	0	0	0	0
Cannon Refuge	45,000	0	20,000	0	16,500	0	15,000	5,000	0	0	0	0	0	0	0	0	0	101,500	250	0	0	0	100
Delair Refuge	10,000	100	1,000	0	12,000	250	3,000	500	0	200	0	0	0	0	0	0	0	27,050	200	0	0	0	0
Shanks Refuge	58,000	10	2,000	0	5,000	100	1,500	0	0	0	0	0	0	0	0	0	0	66,610	0	0	0	0	800
Meyer-Keokuk	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	270	0	0	55	0
TOTAL LOWER	228,950	625	60,800	0	73,100	3,350	77,350	15,300	500	26,200	0	0	2,600	0	100	0	10	488,885	2,180	500	1,000	115	6,200
TOTAL MISSISSIPPI	231,495	625	60,960	0	73,985	3,350	79,970	15,900	38,200	34,200	4,100	0	14,300	0	2,550	25	10	559,670	3,805	500	1,000	185	19,330
10-Year Average 2003-2012	98,125	529	33,061	0	22,879	4,664	28,442	4,265	14,761	23,644	10,760	246	11,607	126	739	0	56	253,904	4,361	121	1,514	348	15,738

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 11/19/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	1,530	0	2,550	0	2,550	1,020	22,950	2,550	0	5,100	2,550	0	0	0	0	0	0	40,800	1,275	0	0	0	10,200
Goose Lake	37,000	0	0	0	7,000	0	0	100	0	0	0	0	0	0	0	0	0	44,100	0	0	0	5	100
Senachwine Lake	21,000	200	2,000	0	11,000	0	0	1,000	0	0	0	0	0	0	0	0	0	35,200	0	0	0	0	0
Hitchcock Slough	8,000	0	0	0	7,300	0	6,000	6,100	0	0	0	0	0	0	0	0	0	27,400	500	0	0	0	0
Douglas Lake	18,000	0	5,000	0	3,000	0	1,000	500	0	0	0	0	0	0	0	0	0	27,500	0	0	0	0	0
Goose Lake	17,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,000	0	0	0	0	0
Upper Peoria	8,000	0	0	0	0	0	0	0	0	0	0	0	1,600	0	100	0	0	9,700	100	0	0	0	0
TOTAL UPPER	110,530	200	9,550	0	30,850	1,020	29,950	10,250	0	5,100	2,550	0	1,600	0	100	0	0	201,700	1,875	0	0	5	10,300

LOWER ILLINOIS RIVER VALLEY

Goose Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	0	0	0	0	0
Big Lake	2,825	0	0	0	0	0	1,100	210	0	0	0	0	200	0	0	0	0	4,335	10	0	0	0	500
Banner Marsh	620	0	0	0	0	0	175	10	0	0	0	0	0	0	0	0	0	805	240	0	0	0	0
Duck Creek	14,500	0	0	0	0	0	2,200	10	0	0	0	0	0	0	0	0	0	16,710	170	0	0	0	0
Clear Lake	11,440	0	0	0	10,010	0	5,700	1,500	0	200	0	0	500	0	0	0	0	29,350	250	0	0	0	350
Chautauqua	71,265	0	40,340	0	45,005	500	40,005	10,085	0	2,000	25	0	500	0	0	0	0	209,725	360	1,000	0	0	600
Emiquon/Spoon Btm	595	0	0	0	500	100	4,100	150	0	6,500	960	0	1,050	0	110	0	200	14,265	85	0	0	50	800
Grass Lake	6,000	0	1,500	0	0	0	2,000	200	250	3,000	2,000	0	500	0	150	0	0	15,600	0	0	0	0	11,000
Jack Lake	4,100	10	1,000	0	0	0	2,000	0	200	8,000	100	50	1,400	0	300	0	0	17,160	10	0	0	0	1,700
Stewart Lake	100	0	0	0	20,300	0	3,000	1,400	0	0	0	0	0	0	0	0	0	24,800	0	0	0	0	0
Crane Lake	9,400	0	750	0	500	0	7,000	1,500	0	24,000	1,000	0	1,000	0	0	0	5	45,155	510	0	0	0	150
Cuba Island	3,800	0	2,500	0	0	0	200	1,000	0	0	0	0	0	0	0	0	0	7,500	500	100	0	0	1,500
Big Lake	500	0	0	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0	1,500	0	0	0	0	0
Spunky Bottoms	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	25	5	0	0	0	0
Meredosia Lake	2,900	0	0	0	2,200	0	1,000	300	200	0	0	0	100	0	0	0	0	6,700	50	0	0	0	100
TOTAL LOWER	133,045	10	46,090	0	79,515	600	68,480	16,390	650	43,700	4,085	50	5,250	0	560	0	205	398,630	2,190	1,100	0	50	16,700
TOTAL ILLINOIS	243,575	210	55,640	0	110,365	1,620	98,430	26,640	650	48,800	6,635	50	6,850	0	660	0	205	600,330	4,065	1,100	0	55	27,000
10-Year Average 2003-2012	172,029	2,791	15,232	0	17,246	1,888	22,904	4,696	1,539	12,341	449	30	6,239	265	978	2	191	258,821	6,669	161	511	281	24,001

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 11/19/2013 Observer: Aaron Yetter

LOCATION	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	10	0	0	0	0	0	0	0	15,560	400	37,250	0	7,800	0	1,760	0	0	62,780	0	0	0	0	300
Arthur Refuge	500	0	100	0	200	0	0	0	0	0	0	0	0	0	0	0	0	800	505	0	0	0	0
Nauvoo-Ft. Madison	10	0	0	0	100	0	0	320	200	0	100	0	110	25	2,100	0	0	2,965	25	0	0	0	550
Ft. Madison-Dallas	0	0	0	0	0	0	0	0	0	0	50	0	0	0	150	0	0	200	330	0	0	50	0
Keithsburg Refuge	700	0	0	0	20	0	110	275	0	0	0	0	0	0	0	0	0	1,105	965	0	0	0	0
Louisa Refuge	250	0	500	0	0	10	300	0	0	4,200	0	0	0	0	0	0	0	5,260	2,250	0	0	300	3,050
TOTAL UPPER	1,470	0	600	0	320	10	410	595	15,760	4,600	37,400	0	7,910	25	4,010	0	0	73,110	4,075	0	0	350	3,900

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	51,800	0	34,200	0	42,750	0	34,200	8,750	0	25,000	200	0	1,500	0	0	0	0	198,400	725	150	2,500	100	1,200
Gilbert Lake	3,000	0	500	0	1,000	0	2,500	2,500	0	0	0	0	0	0	0	0	0	9,500	350	200	0	0	0
Long Lake	15,750	0	2,100	0	1,050	0	1,050	1,050	0	2,000	0	0	0	0	0	0	0	23,000	0	0	0	0	0
Dardenne Club	25,100	0	15,000	0	0	0	1,000	400	0	0	0	0	0	0	0	0	0	41,500	0	0	0	0	1,150
Cuivre Club	15,000	0	15,000	0	1,000	0	2,000	0	0	0	0	0	0	0	0	0	0	33,000	0	0	0	0	100
Batchtown Refuge	12,000	0	1,000	0	5,000	0	2,500	500	0	1,000	0	0	0	0	0	0	0	22,000	400	0	0	0	0
Cannon Refuge	52,470	50	24,750	0	12,900	250	6,930	4,950	0	0	0	0	0	0	0	0	0	102,300	160	0	0	0	200
Delair Refuge	13,720	0	2,800	0	7,600	280	2,800	2,800	0	0	0	0	0	0	0	0	0	30,000	600	100	0	0	0
Shanks Refuge	52,000	0	3,000	0	7,500	0	2,100	0	0	0	100	0	0	0	0	0	0	64,700	0	0	0	0	1,250
Meyer-Keokuk	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	50	0	0	35	10
TOTAL LOWER	240,865	50	98,350	0	78,800	530	55,080	20,950	0	28,000	300	0	1,500	0	0	0	0	524,425	2,285	450	2,500	135	3,910
TOTAL MISSISSIPPI	242,335	50	98,950	0	79,120	540	55,490	21,545	15,760	32,600	37,700	0	9,410	25	4,010	0	0	597,535	6,360	450	2,500	485	7,810
10-Year Average 2003-2012	152,916	692	31,056	0	23,203	2,273	21,814	4,023	17,055	23,849	31,259	333	7,230	588	2,987	122	109	319,510	6,047	418	5,256	197	13,939

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 11/27/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	80	23,000	0	0	0	0	0	0	0	0	500	200	0	0	0	0	0	0	23,700	280	0	0	0	200
Goose Lake	90	16,000	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16,100	0	0	0	0	0
Senachwine Lake	90	60	0	50	0	200	0	0	0	0	0	0	0	0	50	0	0	0	360	0	0	0	0	0
Hitchcock Slough	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Douglas Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	25	0	0	0	0	0
Goose Lake	90	60,000	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60,300	0	0	0	0	0
Upper Peoria	25	175	0	0	0	0	0	0	0	300	0	0	0	900	0	0	0	0	1,375	30	0	0	0	100
TOTAL UPPER		99,235	400	50	0	200	0	0	0	300	500	200	0	925	50	0	0	0	101,860	310	0	0	0	300

LOWER ILLINOIS RIVER VALLEY

Goose Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Lake	99	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Banner Marsh	50	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110	535	0	0	0	0
Duck Creek	5	25,200	0	0	0	0	0	4,000	400	0	0	0	0	0	0	0	0	0	29,600	1,650	300	0	0	0
Clear Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chautauqua	99	2,100	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,110	150	0	0	0	0
Emiquon/Spoon Btm	50	6,535	0	0	0	0	0	235	0	0	200	1,650	0	100	100	300	0	0	9,120	60	0	0	0	125
Grass Lake	80	300	0	0	0	0	0	0	0	0	0	50	0	100	0	0	0	0	450	0	0	0	0	0
Jack Lake	95	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0
Stewart Lake	99	300	0	0	0	7,000	0	100	100	0	0	0	0	0	0	0	0	0	7,500	0	0	0	0	0
Crane Lake	75	11,000	0	0	0	0	0	0	0	0	1,000	500	0	0	0	0	0	0	12,500	0	0	0	0	0
Cuba Island	75	39,600	0	1,000	0	200	0	0	0	0	500	0	0	0	0	0	0	0	41,300	800	500	0	0	0
Big Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	99	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0	0	0	0
TOTAL LOWER		85,375	10	1,000	0	7,200	0	4,335	500	0	1,700	2,200	0	200	100	300	0	0	102,920	3,195	800	0	0	125
TOTAL ILLINOIS		184,610	410	1,050	0	7,400	0	4,335	500	300	2,200	2,400	0	1,125	150	300	0	0	204,780	3,505	800	0	0	425
10-Year Average 2003-2012		191,669	1,844	13,319	0	12,632	918	15,284	5,451	1,201	12,271	1,426	11	3,765	72	646	3	233	260,746	3,687	985	65	116	8,496

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 11/29/2013 Observer: Aaron Yetter

LOCATION	% Ice	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	30	100	0	0	0	0	0	0	0	4,000	0	72,000	0	200	4,000	2,500	0	0	82,800	0	0	0	5	600
Arthur Refuge	95	2,200	0	0	0	0	0	0	0	5,000	0	30,000	0	0	0	0	0	0	37,200	200	0	0	0	0
Nauvoo-Ft. Madison	25	150	0	0	0	0	0	0	0	5,200	0	127,000	0	0	4,600	3,900	1,300	0	142,150	0	0	0	0	0
Ft. Madison-Dallas	10	1,100	0	0	0	0	0	0	0	0	0	32,000	0	0	3,020	0	0	0	36,120	200	0	0	0	0
Keithsburg Refuge	99	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	450	0	0	0	0
Louisa Refuge	99	9,010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,010	560	0	0	20	0
TOTAL UPPER		12,660	0	0	0	0	0	0	0	14,200	0	261,000	0	200	11,620	6,400	1,300	0	307,380	1,410	0	0	25	600

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	99	47,500	50	600	0	0	0	100	0	0	200	50	0	50	0	10	0	50	48,610	200	0	0	0	0
Gilbert Lake	90	1,500	0	1,000	0	2,000	0	1,000	0	0	0	0	0	0	0	0	0	0	5,500	150	250	10	0	0
Long Lake	75	55,000	0	5,000	0	3,000	0	1,000	0	0	0	0	0	0	0	0	0	0	64,000	0	0	0	0	0
Dardenne Club	95	25,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,000	0	0	0	0	0
Cuivre Club	90	55,000	0	10,000	0	0	0	5,000	0	0	0	0	0	0	0	0	0	0	70,000	0	0	0	0	0
Batchtown Refuge	90	30,500	0	1,000	0	3,000	0	1,000	0	0	1,050	0	0	0	0	0	0	0	36,550	200	0	0	0	0
Cannon Refuge	99	44,000	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45,000	0	0	0	0	0
Delair Refuge	90	47,500	0	0	0	2,500	0	0	0	0	0	0	0	0	0	0	0	0	50,000	250	300	0	0	0
Shanks Refuge	95	55,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55,200	0	0	0	0	0
Meyer-Keokuk	5	260	0	0	0	0	0	0	0	25	0	500	0	0	0	0	0	0	785	720	0	0	0	0
TOTAL LOWER		361,460	50	18,600	0	10,500	0	8,100	0	25	1,250	550	0	50	0	10	0	50	400,645	1,520	550	10	0	0
TOTAL MISSISSIPPI		374,120	50	18,600	0	10,500	0	8,100	0	14,225	1,250	261,550	0	250	11,620	6,410	1,300	50	708,025	2,930	550	10	25	600
10-Year Average 2003-2012		173,858	219	28,341	0	18,961	846	20,586	3,591	14,753	15,284	51,576	594	5,152	2,891	2,356	125	41	339,176	4,597	543	3,936	171	7,429

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 12/06/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	50	8,400	150	0	0	0	0	100	10	100	200	300	0	100	0	0	300	0	9,660	1,310	0	0	0	50
Goose Lake	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	5	0	0	0	0
Senachwine Lake	99	23,810	100	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	23,960	0	0	0	0	0
Hitchcock Slough	99	0	0	0	0	0	0	250	100	0	0	0	0	0	0	0	0	0	350	0	0	0	0	0
Douglas Lake	90	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	10
Goose Lake	90	6,900	50	0	0	0	0	0	0	0	200	0	0	0	0	0	0	0	7,150	0	0	0	0	0
Upper Peoria	10	15,300	200	0	0	0	0	0	0	400	0	0	0	475	0	0	0	0	16,375	300	0	0	0	0
TOTAL UPPER		54,510	500	0	0	0	0	350	110	500	400	300	0	625	0	0	310	0	57,605	1,615	0	0	0	60

LOWER ILLINOIS RIVER VALLEY

Goose Lake	90	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
Rice Lake	10	2,000	5	0	0	0	0	0	0	10	0	0	0	0	5	0	5	0	2,025	20	0	0	0	0
Big Lake	95	9,000	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,050	20	0	0	0	0
Banner Marsh	10	530	0	0	0	0	0	700	0	0	0	0	0	0	0	0	0	0	1,230	320	0	0	0	0
Duck Creek	0	12,050	0	0	0	0	0	2,640	0	0	0	0	0	0	100	0	50	0	14,840	955	0	0	0	250
Clear Lake	90	1,000	0	0	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0	2,000	15	0	0	0	0
Chautauqua	95	900	15	0	0	0	0	400	0	0	0	0	0	0	0	0	0	0	1,315	800	0	0	0	0
Emiquon/Spoon Btm	20	8,050	0	0	0	0	0	30	0	0	0	400	0	200	200	100	150	15	9,145	150	0	0	5	50
Grass Lake	30	6,000	5	0	0	0	0	0	0	0	400	0	0	0	25	0	0	0	6,430	200	0	0	0	0
Jack Lake	20	310	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	320	20	0	0	0	0
Stewart Lake	95	100	0	0	0	7,000	0	0	100	0	0	0	0	0	0	0	0	0	7,200	0	0	0	0	0
Crane Lake	50	2,700	0	0	0	1,500	0	0	0	0	0	5	0	0	0	0	0	0	4,205	350	0	0	0	0
Cuba Island	20	3,500	0	0	0	1,000	0	0	0	0	200	0	0	0	0	0	50	0	4,750	300	250	0	0	0
Big Lake	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	50	4,500	0	0	0	0	0	0	0	0	0	100	0	0	50	0	10	0	4,660	0	0	0	0	0
TOTAL LOWER		50,645	80	0	0	10,500	0	3,770	100	10	600	505	0	200	380	105	265	15	67,175	3,150	250	0	5	300
TOTAL ILLINOIS		105,155	580	0	0	10,500	0	4,120	210	510	1,000	805	0	825	380	105	575	15	124,780	4,765	250	0	5	360
10-Year Average 2003-2012		185,144	2,707	7,762	0	13,425	76	14,074	5,045	1,825	11,898	1,309	28	7,839	499	684	188	404	252,906	8,546	1,169	1,416	63	10,033

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 12/12/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Senachwine Lake	99	10,000	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,025	0	0	0	0	0
Hitchcock Slough	99	300	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	305	0	0	0	0	0
Douglas Lake	99	8,000	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,025	300	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Peoria	99	65,000	0	0	0	0	0	0	0	0	0	0	0	0	50	0	680	0	65,730	35	0	0	0	0
TOTAL UPPER		83,300	55	0	0	0	0	0	0	0	0	0	0	0	50	0	680	0	84,085	360	0	0	0	0

LOWER ILLINOIS RIVER VALLEY

Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Banner Marsh	95	330	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	330	1,235	0	0	0	0
Duck Creek	5	17,400	0	0	0	0	0	0	0	0	0	0	0	0	1,100	0	410	0	18,910	11,700	0	0	0	0
Clear Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0
Chautauqua	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emiquon/Spoon Btm	99	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	5	0	105	5	0	0	0	0
Grass Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jack Lake	99	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0	0	0
Stewart Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane Lake	99	200	5	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	210	35	0	0	0	0
Cuba Island	99	500	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	1,000	1,550	300	0	0	0
Big Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	99	4,000	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	4,010	50	0	0	0	0
TOTAL LOWER		22,440	5	0	0	0	0	0	0	0	500	15	0	0	1,205	0	415	0	24,580	14,580	300	0	0	0
TOTAL ILLINOIS		105,740	60	0	0	0	0	0	0	0	500	15	0	0	1,255	0	1,095	0	108,665	14,940	300	0	0	0
10-Year Average 2003-2012		151,454	2,199	9,721	0	3,434	0	4,195	505	356	3,369	306	0	2,426	762	216	394	321	179,659	12,058	471	1,359	9	2,089

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 12/12/2013 Observer: Aaron Yetter

LOCATION	ICE%	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	99	0	0	0	0	0	0	0	0	0	0	2,600	0	0	110	0	0	0	2,710	0	0	0	0	0
Arthur Refuge	99	2,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,000	200	0	0	0	0
Nauvoo-Ft. Madison	99	15	0	0	0	0	0	0	0	0	0	9,000	0	0	1,250	0	1,950	0	12,215	10	0	0	0	0
Ft. Madison-Dallas	99	100	0	0	0	0	0	0	0	0	0	410	0	0	1,035	0	1,000	0	2,545	705	0	0	0	0
Keithsburg Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Louisa Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL UPPER		2,115	0	0	0	0	0	0	0	0	0	12,010	0	0	2,395	0	2,950	0	19,470	915	0	0	0	0

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	99	45,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	45,105	600	150	0	0	0
Gilbert Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Lake	90	55,000	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55,200	15	0	0	0	0
Dardenne Club	99	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Cuivre Club	99	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	0	0	0	0	0
Batchtown Refuge	99	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
Cannon Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delair Refuge	95	32,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32,000	400	0	0	0	0
Shanks Refuge	99	18,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18,000	0	0	0	0	0
Meyer-Keokuk	95	575	0	0	0	0	0	0	0	0	0	160	0	0	350	0	200	0	1,285	0	0	0	0	0
TOTAL LOWER		155,785	0	200	0	0	0	0	0	0	0	160	0	0	350	0	205	0	156,700	1,015	150	0	0	0
TOTAL MISSISSIPPI		157,900	0	200	0	0	0	0	0	0	0	12,170	0	0	2,745	0	3,155	0	176,170	1,930	150	0	0	0
10-Year Average 2003-2012		136,286	334	14,426	0	7,461	31	6,950	1,036	8,360	7,460	29,348	477	2,941	5,019	3,954	2,290	18	226,394	7,406	324	1,843	15	2,111

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 12/19/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	99	7,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,000	0	0	0	0	0
Goose Lake	99	2,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,600	10	0	0	0	0
Senachwine Lake	99	4,200	5	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	4,355	245	0	0	0	0
Hitchcock Slough	95	3,100	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,130	135	0	0	0	0
Douglas Lake	99	3,010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,010	10	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Peoria	95	40,300	205	0	0	0	0	0	0	0	0	10	0	10	140	0	1,010	0	41,675	0	0	0	0	0
TOTAL UPPER		60,210	240	0	0	0	0	0	0	0	0	10	0	10	140	0	1,160	0	61,770	400	0	0	0	0

LOWER ILLINOIS RIVER VALLEY

Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	99	1,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,100	4,000	0	0	0	0
Big Lake	100	700	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	725	300	0	0	0	0
Banner Marsh	99	600	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	700	250	0	0	0	0
Duck Creek	10	7,000	0	0	0	0	0	500	0	0	0	0	0	0	0	0	1,005	0	8,505	6,760	0	0	0	150
Clear Lake	99	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	30	35	0	0	0	0
Chautauqua	99	700	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	710	1,590	0	0	0	0
Emiquon/Spoon Btm	99	425	0	0	0	0	0	0	0	0	0	10	0	0	0	0	35	20	490	15	0	0	0	0
Grass Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jack Lake	95	100	0	0	0	0	0	0	0	0	15	5	0	40	0	0	0	0	160	100	0	0	0	0
Stewart Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	0	0	0
Crane Lake	99	200	0	0	0	0	0	0	0	0	700	0	0	0	0	0	0	0	900	75	0	0	0	0
Cuba Island	99	300	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	800	2,130	0	0	0	0
Big Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	99	150	0	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0	350	15	0	0	0	0
TOTAL LOWER		11,300	0	0	0	0	0	810	0	0	1,240	15	0	40	0	0	1,045	20	14,470	15,770	0	0	0	150
TOTAL ILLINOIS		71,510	240	0	0	0	0	810	0	0	1,240	25	0	50	140	0	2,205	20	76,240	16,170	0	0	0	150
10-Year Average 2003-2012		123,608	1,886	2,994	0	5,421	7	3,149	1,951	160	3,914	107	0	526	1,541	219	804	244	146,533	12,486	3,080	2,664	3	1,917

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 12/23/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goose Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senachwine Lake	99	4,200	0	0	0	0	0	0	0	0	0	0	0	0	100	0	100	0	4,400	130	0	0	0	0
Hitchcock Slough	99	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	400	250	0	0	0	0
Douglas Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Peoria	99	26,400	100	0	0	0	0	0	0	0	0	0	0	0	700	0	800	0	28,000	0	0	0	0	0
TOTAL UPPER		31,000	100	0	0	0	0	0	0	0	0	0	0	0	800	0	900	0	32,800	380	0	0	0	0

LOWER ILLINOIS RIVER VALLEY

Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0
Big Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Banner Marsh	99	100	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	150	250	0	0	0	0
Duck Creek	10	3,450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	770	0	4,220	11,440	300	0	0	100
Clear Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	350	0	0	0	0
Chautauqua	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	625	20	0	0	0
Emiquon/Spoon Btm	99	10	0	0	0	0	0	0	0	0	0	0	0	0	25	0	100	0	135	0	0	0	0	0
Grass Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jack Lake	95	11,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,000	300	25	0	0	0
Stewart Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0
Crane Lake	99	0	0	0	0	0	0	0	0	0	500	0	0	0	0	0	0	0	500	900	0	0	0	0
Cuba Island	95	205	0	0	0	0	0	0	0	0	75	0	0	0	0	0	5	0	285	1,330	0	0	0	0
Big Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	99	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	600	100	0	0	0
TOTAL LOWER		15,065	0	0	0	0	0	50	0	0	575	0	0	0	25	0	885	0	16,600	15,865	445	0	0	100
TOTAL ILLINOIS		46,065	100	0	0	0	0	50	0	0	575	0	0	0	825	0	1,785	0	49,400	16,245	445	0	0	100
10-Year Average 2003-2012		78,491	688	78	0	778	0	1,743	113	346	978	138	0	1,322	1,488	126	2,010	85	88,384	26,791	2,982	796	1	557

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 12/23/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	99	0	0	0	0	0	0	0	0	0	0	12,000	0	0	0	0	3,200	0	15,200	800	0	0	0	0
Arthur Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nauvoo-Ft. Madison	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	125	0	125	150	0	0	0	0
Ft. Madison-Dallas	99	0	0	0	0	0	0	0	0	0	0	1,000	0	0	0	0	4,300	0	5,300	1,030	0	0	0	0
Keithsburg Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Louisa Refuge	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,010	0	3,010	500	0	0	0	0
TOTAL UPPER		0	0	0	0	0	0	0	0	0	0	13,000	0	0	0	0	10,635	0	23,635	2,480	0	0	0	0
LOWER MISSISSIPPI RIVER VALLEY																								
Swan Lake	99	550	0	0	0	0	0	200	0	0	1,000	0	0	0	0	0	10	0	1,760	750	225	0	0	0
Gilbert Lake	99	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	0	0	0	0
Long Lake	90	45,000	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45,100	0	0	0	0	0
Dardenne Club	95	74,000	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74,100	0	0	0	0	0
Cuivre Club	99	9,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9,000	0	0	0	0	0
Batchtown Refuge	95	4,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,000	25	0	0	0	0
Cannon Refuge	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delair Refuge	95	25,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25,000	800	400	0	0	0
Shanks Refuge	99	5,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,000	0	0	0	0	0
Meyer-Keokuk	75	0	0	0	0	0	0	0	0	0	0	20	0	0	50	0	3,060	0	3,130	3,810	0	0	0	0
TOTAL LOWER		162,600	200	0	0	0	0	200	0	0	1,000	20	0	0	50	0	3,070	0	167,140	5,435	625	0	0	0
TOTAL MISSISSIPPI		162,600	200	0	0	0	0	200	0	0	1,000	13,020	0	0	50	0	13,705	0	190,775	7,915	625	0	0	0
10-Year Average 2003-2012		118,903	426	3,159	0	2,089	2	1,852	156	5,128	6,503	36,381	62	889	6,738	1,853	8,236	0	192,378	13,199	1,337	3,342	44	406

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 12/30/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goose Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senachwine Lake	99	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	205	525	0	0	0	0
Hitchcock Slough	99	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	200	0	0	0	0
Douglas Lake	99	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	200	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Peoria	99	25,000	250	0	0	0	0	0	0	0	0	0	0	0	110	0	675	0	26,035	210	0	0	0	0
TOTAL UPPER		25,900	250	0	0	0	0	0	0	0	0	0	0	0	110	0	680	0	26,940	1,135	0	0	0	0

LOWER ILLINOIS RIVER VALLEY

Goose Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	0	0
Big Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Banner Marsh	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	0	0
Duck Creek	10	2,800	0	0	0	0	0	200	0	0	0	0	0	0	0	0	1,000	0	4,000	6,900	500	0	0	100
Clear Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0
Chautauqua	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	310	75	0	0	0
Emiquon/Spoon Btm	99	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	460	10	495	0	0	0	0	0
Grass Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jack Lake	95	50	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	100	800	250	0	0	0
Stewart Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crane Lake	95	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	600	700	5	0	0
Cuba Island	95	100	0	0	0	0	0	0	0	0	350	0	0	0	0	0	0	0	450	650	0	0	0	0
Big Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	99	50	0	0	0	0	0	0	0	0	0	5	0	0	0	0	30	0	85	655	150	0	0	0
TOTAL LOWER		3,100	0	0	0	0	0	200	0	0	350	5	0	50	25	0	1,495	10	5,235	10,140	1,675	5	0	100
TOTAL ILLINOIS		29,000	250	0	0	0	0	200	0	0	350	5	0	50	135	0	2,175	10	32,175	11,275	1,675	5	0	100
10-Year Average 2003-2012		78,491	688	78	0	778	0	1,743	113	346	978	138	0	1,322	1,488	126	2,010	85	88,384	26,791	2,982	796	1	557

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 12/30/2013 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	99	0	0	0	0	0	0	0	0	0	0	2,000	0	0	0	0	500	0	2,500	750	0	0	0	0
Arthur Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nauvoo-Ft. Madison	99	0	0	0	0	0	0	0	0	10	0	100	0	0	0	0	50	0	160	50	0	0	5	0
Ft. Madison-Dallas	99	200	0	0	0	0	0	0	0	0	0	1,325	0	0	0	0	1,160	0	2,685	1,400	0	0	0	0
Keithsburg Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	125	0	0	0	0
Louisa Refuge	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	510	0	510	150	0	0	0	0
TOTAL UPPER		200	0	0	0	0	0	0	0	10	0	3,425	0	0	0	0	2,225	0	5,860	2,475	0	0	5	0

LOWER MISSISSIPPI RIVER VALLEY

Swan Lake	99	400	0	0	0	0	0	0	0	0	100	15	0	0	25	0	140	0	680	350	400	0	0	0
Gilbert Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Lake	95	35,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,500	0	0	0	0	0
Dardenne Club	95	50,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50,000	0	0	0	0	0
Cuivre Club	99	3,000	0	0	0	0	0	150	0	0	0	0	0	0	0	0	0	0	3,150	0	0	0	0	0
Batchtown Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cannon Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Delair Refuge	95	35,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35,000	150	0	0	0	0
Shanks Refuge	100	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0
Meyer-Keokuk	90	0	0	0	0	0	0	0	0	0	0	3,900	0	0	0	0	3,550	0	7,450	5,350	0	0	0	0
TOTAL LOWER		123,910	0	0	0	0	0	150	0	0	100	3,915	0	0	25	0	3,690	0	131,790	5,850	400	0	0	0
TOTAL MISSISSIPPI		124,110	0	0	0	0	0	150	0	10	100	7,340	0	0	25	0	5,915	0	137,650	8,325	400	0	5	0
10-Year Average 2003-2012		118,903	426	3,159	0	2,089	2	1,852	156	5,128	6,503	36,381	62	889	6,738	1,853	8,236	0	192,378	13,199	1,337	3,342	44	406

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER ILLINOIS RIVER VALLEY Date: 01/08/2014 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Hennepin/Hopper	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senachwine Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Hitchcock Slough	99	10	5	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	25	0	0	0	0	0
Douglas Lake	99	2,800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,800	0	0	0	0	0
Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upper Peoria	99	15,000	150	0	0	0	0	0	0	0	0	0	0	0	30	0	70	0	15,250	100	0	0	0	0
TOTAL UPPER		17,810	155	0	0	0	0	0	0	0	0	0	0	0	30	0	80	0	18,075	110	0	0	0	0

LOWER ILLINOIS RIVER VALLEY

Goose Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rice Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Big Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Banner Marsh	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	10	0	0	0	0	0
Duck Creek	60	6,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	500	0	7,000	18,600	75	0	0	0
Clear Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chautauqua	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emiquon/Spoon Btm	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	810	10	820	10	0	0	0	0
Grass Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jack Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stewart Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0
Crane Lake	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	1,000	250	0	0	0
Cuba Island	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	855	0	0	0	0
Big Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	0	0	0
TOTAL LOWER		6,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,320	15	7,835	20,615	355	0	0	0
TOTAL ILLINOIS		24,310	155	0	0	0	0	0	0	0	0	0	0	0	30	0	1,400	15	25,910	20,725	355	0	0	0
10-Year Average 2003-2012		70,368	158	0	0	0	0	218	75	275	900	265	0	100	2,283	0	4,680	25	79,345	16,155	6,425	12,350	1	325

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

UPPER MISSISSIPPI RIVER VALLEY Date: 01/08/2014 Observer: Aaron Yetter

LOCATION	%ICE	MALL	ABDU	NOPI	BWTE	AGWT	AMWI	GADW	NSHO	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS	CAGO	GWFG	LSGO	WHPE	AMCO
Keokuk-Nauvoo	99	0	0	0	0	0	0	0	0	0	0	800	0	0	0	0	50	0	850	1,500	0	0	0	0
Arthur Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nauvoo-Ft. Madison	99	800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	800	10	0	0	0	0
Ft. Madison-Dallas	99	10	0	0	0	0	0	0	0	0	0	105	0	0	0	0	300	0	415	950	0	0	0	0
Keithsburg Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Louisa Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL UPPER		810	0	0	0	0	0	0	0	0	0	905	0	0	0	0	350	0	2,065	2,460	0	0	0	0
LOWER MISSISSIPPI RIVER VALLEY																								
Swan Lake	99	200	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	205	100	0	0	0	0
Gilbert Lake	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long Lake	99	15,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	0	0	0	0	0
Dardenne Club	99	30,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30,000	2,000	0	0	0	0
Cuivre Club	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Batchtown Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Cannon Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Delair Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shanks Refuge	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meyer-Keokuk	95	100	0	0	0	0	0	0	0	0	0	105	0	0	0	0	3,350	0	3,555	3,600	0	0	50	0
TOTAL LOWER		45,300	5	0	0	0	0	0	0	0	0	105	0	0	0	0	3,350	0	48,760	5,715	0	0	50	0
TOTAL MISSISSIPPI		46,110	5	0	0	0	0	0	0	0	0	1,010	0	0	0	0	3,700	0	50,825	8,175	0	0	50	0
10-Year Average 2003-2012		116,990	75	0	0	0	0	455	0	3,705	400	21,733	0	0	5,045	455	8,948	0	157,805	7,255	1,125	1,775	26	0

Appendix 2. 2014 Spring-Migration Diving Duck Inventories of the Illinois River Valley and Pool 19 of the Mississippi River by Date and Location

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

ILLINOIS RIVER VALLEY Date: March 17, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Turner Lake	375	0	35	0	0	0	10	0	0	420
Depue, Spring	300	0	300	0	0	30	50	320	0	1,000
Coleman Lake	100	150	0	0	0	0	0	0	0	250
Bureau Ponds	0	0	0	0	0	0	0	10	0	10
Goose Lake	610	50	125	0	100	0	10	10	0	905
Senachwine Lake	6,750	200	1,160	30	0	0	25	30	0	8,195
Hennepin/Hopper	0	0	0	0	0	0	0	0	0	0
Swan Lake	100	200	300	0	0	0	0	30	0	630
Sawmill Lake	0	0	300	0	0	0	0	0	0	300
Billsbach Lake	900	200	1,000	0	0	0	0	0	0	2,100
Weis Lake	100	0	300	0	0	0	50	0	0	450
Sparland	2,500	300	520	200	20	0	110	0	0	3,650
Wightman Lake	10	0	0	0	0	0	10	0	0	20
Sawyer Slough	300	0	300	0	0	0	0	0	0	600
Hitchcock Slough	100	100	100	20	0	0	0	0	0	320
Babbs Slough	4,100	0	100	0	0	50	0	0	0	4,250
Meadow Lake	50	100	100	0	0	0	50	0	0	300
Douglas Lake	4,200	0	1,000	0	0	0	0	0	0	5,200
Goose Lake	14,200	0	1,500	0	200	200	200	50	0	16,350
Upper Peoria	6,100	100	1,200	0	100	350	100	230	0	8,180
Lower Peoria	2,600	0	0	0	200	0	0	10	0	2,810
Pekin Lake	800	0	100	0	0	0	0	0	0	900
Powerton Lake	0	0	0	0	0	0	0	0	0	0
Spring Lake	0	0	50	0	0	0	0	80	20	150
Spring Lake Bottoms	0	100	0	0	0	0	60	10	0	170
Goose Lake	7,500	12,000	6,500	200	0	100	0	500	0	26,800
Rice Lake	300	0	400	0	0	0	0	50	0	750
Big Lake	12,000	4,000	2,000	300	1,000	0	500	0	0	19,800
Banner Marsh	0	0	0	0	0	20	10	60	0	90
Duck Creek	100	0	0	0	0	0	0	230	0	330
Clear Lake	10,675	500	610	0	75	0	0	20	0	11,880
North Pool	100	0	10	0	0	10	70	20	0	210
South Pool	1,000	500	5,000	0	0	20	20	10	0	6,550
Quiver Creek	200	5,000	500	0	0	0	0	0	0	5,700
Quiver Lake	1,500	1,050	400	0	0	20	0	0	0	2,970
Thompson/Flag Lake	8,190	2,100	3,150	210	5,250	630	420	1,050	0	21,000
North Globe	0	0	0	0	0	0	0	0	0	0
Dickson Mounds	0	0	0	0	0	0	0	10	0	10
South Globe	1,000	0	100	0	400	0	100	0	0	1,600
Wilder/Bellrose	4,200	5,600	11,200	0	280	840	280	560	0	22,960
Spoon River Btms	100	0	0	0	0	0	0	0	0	100
Matanza Lake	100	0	200	0	100	0	0	0	0	400
Bath Lake	5,000	5,000	10,300	0	0	0	0	0	0	20,300
Moscow Lake	600	2,500	1,000	0	0	0	0	0	0	4,100
Jack Lake	2,200	0	100	0	0	50	100	150	0	2,600
Grass Lake	1,950	3,200	610	0	0	0	0	0	0	5,760
Anderson Lake	200	100	600	0	400	60	0	200	0	1,560
Snicarte Slough	2,000	8,000	3,200	0	0	0	0	0	0	13,200
Ingram Lake	1,100	1,000	600	0	0	0	0	0	0	2,700
Chain Lake	0	0	0	0	600	0	0	0	0	600
Stewart Lake	5,000	1,000	200	0	0	0	0	0	0	6,200
Crane Lake	4,100	4,000	910	0	150	0	0	10	0	9,170
Cuba Island	3,000	1,000	300	0	0	0	0	0	0	4,300
Sanganois	0	2,000	0	0	0	0	0	100	0	2,100
Treadway Lake	1,600	200	1,700	0	200	0	0	0	0	3,700
Muscooten Bay	0	0	0	0	0	0	0	0	0	0
Big Lake	1,500	12,000	900	0	0	0	0	0	0	14,400
Meredosia Lake	1,800	5,000	4,100	0	0	0	0	0	0	10,900
Smith Lake	0	0	100	0	0	0	0	0	0	100
Spunky Bottoms	3,500	16,500	10,500	840	560	0	100	100	0	32,100
TOTAL	124,710	93,750	73,680	1,800	9,635	2,380	2,275	3,850	20	312,100

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

ILLINOIS RIVER VALLEY Date: April 8-9, 2014* Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Turner Lake	125	0	0	0	0	0	5	0	10	140
Depue, Spring	490	0	5	0	0	0	0	0	0	495
Coleman Lake	4,000	1,500	100	300	0	0	0	0	0	5,900
Bureau Ponds	875	0	0	0	0	0	5	0	0	880
Goose Lake	2,600	2,050	200	0	150	0	0	0	0	5,000
Senachwine Lake	500	0	0	0	100	0	0	0	0	600
Hennepin/Hopper	12,375	1,375	825	550	825	0	0	0	0	15,950
Swan Lake	3,500	200	0	500	100	0	0	0	0	4,300
Sawmill Lake	500	0	0	0	0	0	0	0	0	500
Billsbach Lake	250	700	0	0	100	0	0	0	0	1,050
Weis Lake	4,000	1,000	0	0	100	0	0	0	0	5,100
Sparland	0	0	0	25	100	0	0	0	0	125
Wightman Lake	300	100	0	0	0	0	0	0	0	400
Sawyer Slough	300	50	0	0	0	0	0	0	0	350
Hitchcock Slough	300	1,500	0	0	50	0	0	0	0	1,850
Babbs Slough	1,100	0	0	0	150	0	0	0	0	1,250
Meadow Lake	1,500	200	50	0	0	0	0	0	20	1,770
Douglas Lake	150	900	25	0	0	0	50	0	0	1,125
Goose Lake	560	210	0	0	300	0	0	0	0	1,070
Upper Peoria	110	0	0	0	1,000	0	0	0	0	1,110
Lower Peoria	100	0	0	0	0	0	10	0	0	110
Pekin Lake	12,000	1,000	500	0	0	0	0	0	0	13,500
Powerton Lake	0	0	0	0	0	0	0	0	0	0
Spring Lake	10	0	0	0	0	0	10	0	0	20
Spring Lake Bottoms	505	0	0	100	0	0	0	0	0	605
Goose Lake	0	100	0	0	0	0	0	0	0	100
Rice Lake	570	0	5	0	200	0	15	0	0	790
Big Lake	15	530	5	0	15	0	0	0	0	565
Banner Marsh	0	0	0	0	0	0	10	0	0	10
Duck Creek	0	0	0	0	0	0	0	0	0	0
Clear Lake	755	200	0	0	30	0	0	0	0	985
North Pool	170	2,200	0	10	1,350	0	0	0	0	3,730
South Pool	1,800	1,600	50	250	50	0	20	0	0	3,770
Quiver Creek	0	0	0	0	0	0	0	0	0	0
Quiver Lake	400	100	0	0	0	0	0	0	0	500
Thompson/Flag Lake	1,115	670	225	225	2,230	0	225	110	0	4,800
North Globe	50	0	0	0	0	0	0	0	0	50
Dickson Mounds	0	0	0	0	0	0	0	0	0	0
South Globe	0	0	0	0	60	0	0	0	0	60
Wilder/Bellrose	0	10	0	0	0	0	0	0	0	10
Spoon River Btms	10	25	0	0	0	0	0	0	0	35
Matanza Lake	0	0	0	0	0	0	0	0	0	0
Bath Lake	100	400	0	0	0	0	0	0	0	500
Moscow Lake	65	150	0	0	30	0	0	0	0	245
Jack Lake	355	440	90	60	50	0	0	0	0	995
Grass Lake	410	300	0	0	310	0	0	0	0	1,020
Anderson Lake	450	0	200	0	4,100	0	0	0	0	4,750
Snicarte Slough	150	400	0	0	0	0	0	0	0	550
Ingram Lake	10	300	0	0	0	0	0	0	0	310
Chain Lake	560	400	0	0	400	0	0	0	0	1,360
Stewart Lake	225	0	0	0	205	0	0	0	0	430
Crane Lake	120	0	0	0	0	0	0	0	0	120
Cuba Island	420	7,500	0	100	0	0	0	0	0	8,020
Sanganois	635	820	20	0	0	0	10	0	0	1,485
Treadway Lake	800	1,300	0	200	100	0	0	0	0	2,400
Muscooten Bay	0	300	0	0	0	0	0	0	0	300
Big Lake	30	100	0	0	225	0	0	0	0	355
Meredosia Lake	90	1,100	0	200	60	0	0	0	0	1,450
Smith Lake	10	0	0	35	10	0	0	0	0	55
Spunky Bottoms	0	200	0	0	0	0	0	0	0	200
TOTAL	55,465	29,930	2,300	2,555	12,400	0	360	110	30	103,150

*Upper Illinois River above Pekin was flown April 8th and Lower Illinois River below Pekin was flown April 9th.

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

ILLINOIS RIVER VALLEY Date: April 15, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Turner Lake	0	0	5	0	0	0	0	0	0	5
Depue, Spring	30	0	0	0	25	0	0	0	0	55
Coleman Lake	1,000	2,000	100	0	10	0	0	0	0	3,110
Bureau Ponds	2,100	0	0	0	300	0	100	0	0	2,500
Goose Lake	50	0	0	0	235	0	50	0	0	335
Senachwine Lake	50	0	0	100	175	0	0	0	0	325
Hennepin/Hopper	2,000	0	650	50	0	0	170	0	0	2,870
Swan Lake	400	0	0	0	0	0	0	0	0	400
Sawmill Lake	200	0	0	0	0	0	0	0	0	200
Billsbach Lake	500	1,000	0	100	0	0	0	0	0	1,600
Weis Lake	100	10	0	0	0	0	0	0	0	110
Sparland	0	0	0	0	200	0	0	0	0	200
Wightman Lake	320	0	0	0	0	0	0	0	0	320
Sawyer Slough	50	0	0	0	0	0	0	0	0	50
Hitchcock Slough	0	0	0	0	250	0	0	0	0	250
Babbs Slough	0	0	0	0	200	0	0	0	0	200
Meadow Lake	405	0	0	0	50	0	0	0	0	455
Douglas Lake	155	0	0	0	110	0	10	0	0	275
Goose Lake	5	0	0	0	10	0	0	0	0	15
Upper Peoria	0	0	0	0	0	0	0	0	0	0
Lower Peoria	0	0	0	0	0	0	0	0	0	0
Pekin Lake	2,000	0	0	0	0	0	0	0	0	2,000
Powerton Lake	0	0	0	0	0	0	0	0	0	0
Spring Lake	0	0	0	0	0	0	0	0	0	0
Spring Lake Bottoms	50	0	0	100	0	0	0	0	0	150
Goose Lake	0	0	0	0	0	0	0	0	0	0
Rice Lake	150	0	0	0	1,600	0	0	0	0	1,750
Big Lake	0	0	0	0	100	0	0	0	0	100
Banner Marsh	0	0	0	0	0	0	0	0	0	0
Duck Creek	0	0	0	0	0	0	0	0	0	0
Clear Lake	10	0	0	0	200	0	0	0	0	210
North Pool	700	200	0	0	660	0	0	0	0	1,560
South Pool	310	0	0	0	150	0	10	0	0	470
Quiver Creek	100	0	0	0	0	0	0	0	0	100
Quiver Lake	10	0	0	0	0	0	0	0	0	10
Thompson/Flag Lake	1,025	410	410	205	2,050	0	205	0	0	4,305
North Globe	0	0	0	0	0	0	0	0	0	0
Dickson Mounds	0	0	0	0	0	0	0	0	0	0
South Globe	0	0	0	0	0	0	0	40	0	40
Wilder/Bellrose	0	0	0	0	0	0	0	0	0	0
Spoon River Btms	0	0	0	0	0	0	0	0	0	0
Matanza Lake	0	0	0	0	0	0	0	0	0	0
Bath Lake	10	0	0	0	0	0	0	0	0	10
Moscow Lake	0	0	0	0	0	0	0	0	0	0
Jack Lake	0	0	0	0	300	0	0	0	0	300
Grass Lake	0	0	0	0	1,900	0	0	0	0	1,900
Anderson Lake	0	0	0	0	1,230	0	0	0	0	1,230
Snicarte Slough	0	0	0	0	0	0	0	0	0	0
Ingram Lake	0	0	0	0	0	0	0	0	0	0
Chain Lake	0	0	0	0	200	0	0	0	0	200
Stewart Lake	0	0	0	0	200	0	0	0	0	200
Crane Lake	50	0	0	0	300	0	0	0	0	350
Cuba Island	0	0	0	0	0	0	0	0	0	0
Sanganois	0	0	0	0	0	0	0	0	0	0
Treadway Lake	10	0	0	0	0	0	0	0	0	10
Muscooten Bay	0	0	0	0	0	0	0	0	0	0
Big Lake	20	150	0	0	100	0	0	0	0	270
Meredosia Lake	0	0	0	0	0	0	0	0	0	0
Smith Lake	0	0	0	0	50	0	0	0	0	50
Spunky Bottoms	20	0	0	0	500	0	0	0	0	520
TOTAL	11,830	3,770	1,165	555	11,105	0	545	40	0	29,010

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

ILLINOIS RIVER VALLEY Date: April 23, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Turner Lake	0	0	0	0	0	0	0	0	0	0
Depue, Spring	0	0	0	0	0	0	0	0	0	0
Coleman Lake	0	0	0	0	0	0	0	0	0	0
Bureau Ponds	10	0	0	0	0	0	0	0	0	10
Goose Lake	0	0	0	0	0	0	0	0	0	0
Senachwine Lake	0	0	0	0	20	0	0	0	0	20
Hennepin/Hopper	95	130	0	0	270	0	20	0	0	515
Swan Lake	0	0	0	0	0	0	0	0	0	0
Sawmill Lake	0	0	0	0	0	0	0	0	0	0
Billsbach Lake	5	0	0	0	0	0	0	0	0	5
Weis Lake	0	0	0	0	0	0	0	0	0	0
Sparland	0	0	0	0	0	0	0	0	0	0
Wightman Lake	0	0	0	0	25	0	0	0	0	25
Sawyer Slough	0	0	0	0	0	0	0	0	0	0
Hitchcock Slough	0	0	0	0	0	0	0	0	0	0
Babbs Slough	0	0	0	0	10	0	0	0	0	10
Meadow Lake	0	0	0	0	0	0	0	0	0	0
Douglas Lake	0	0	0	0	0	0	0	0	0	0
Goose Lake	0	0	0	0	0	0	0	0	0	0
Upper Peoria	0	0	0	0	0	0	0	0	0	0
Lower Peoria	0	0	0	0	0	0	0	0	0	0
Pekin Lake	150	10	0	0	0	0	0	0	0	160
Powerton Lake	0	0	0	0	0	0	0	0	0	0
Spring Lake	0	0	0	0	0	0	0	0	0	0
Spring Lake Bottoms	0	0	0	0	0	0	0	0	0	0
Goose Lake	0	0	0	0	0	0	0	0	0	0
Rice Lake	0	0	0	0	0	0	0	0	0	0
Big Lake	0	0	0	0	0	0	0	0	0	0
Banner Marsh	5	0	0	0	0	0	0	0	0	5
Duck Creek	0	0	0	0	0	0	0	0	0	0
Clear Lake	0	0	0	0	0	0	0	0	0	0
North Pool	100	0	0	0	610	0	0	0	0	710
South Pool	20	0	0	0	0	0	10	0	0	30
Quiver Creek	0	0	0	0	0	0	0	0	0	0
Quiver Lake	0	0	0	0	0	0	0	0	0	0
Thompson/Flag Lake	300	50	5	0	500	0	50	0	0	905
North Globe	0	0	0	0	0	0	0	0	0	0
Dickson Mounds	0	0	0	0	0	0	0	0	0	0
South Globe	0	0	0	0	0	0	0	0	0	0
Wilder/Bellrose	0	0	0	0	0	0	0	0	0	0
Spoon River Btms	0	0	0	0	0	0	0	0	0	0
Matanza Lake	10	0	0	0	0	0	0	0	0	10
Bath Lake	0	0	0	0	0	0	0	0	0	0
Moscow Lake	0	0	0	0	0	0	0	0	0	0
Jack Lake	0	0	0	0	0	0	0	0	0	0
Grass Lake	0	0	0	0	0	0	0	0	0	0
Anderson Lake	0	0	0	0	5	0	0	0	0	5
Snicarte Slough	0	0	0	0	0	0	0	0	0	0
Ingram Lake	0	0	0	0	0	0	0	0	0	0
Chain Lake	0	0	0	0	0	0	0	0	0	0
Stewart Lake	0	0	0	0	0	0	0	0	0	0
Crane Lake	0	0	0	0	0	0	0	0	0	0
Cuba Island	5	0	0	0	0	0	0	0	0	5
Sanganois	5	0	0	0	0	0	0	0	0	5
Treadway Lake	0	0	0	0	0	0	0	0	0	0
Muscooten Bay	0	0	5	0	0	0	0	0	0	5
Big Lake	0	0	0	0	0	0	0	0	0	0
Meredosia Lake	0	0	0	0	0	0	0	0	0	0
Smith Lake	0	0	0	0	0	0	0	0	0	0
Spunky Bottoms	0	0	0	0	0	0	0	0	0	0
TOTAL	705	190	10	0	1,440	0	80	0	0	2,425

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

Pool 19 Mississippi River Date: March 17, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Keokuk-Nauvoo	41,410	1,700	38,350	450	160	60	60	610	10	82,810
Arthur Refuge	9,300	0	200	0	0	0	0	0	0	9,500
Nauvoo-Ft. Mad.	51,500	0	16,065	0	100	3,510	10	850	0	72,035
Ft.Madison-Dallas	1,700	500	4,800	0	0	55	20	800	0	7,875
Dallas-Burlington	20,100	5,000	24,055	0	0	50	0	0	0	49,205
Turkey Slough	2,500	0	11,200	0	0	0	0	100	0	13,800
Burling. - 18 Dam	0	0	0	0	0	0	0	0	0	0
Total	126,510	7,200	94,670	450	260	3,675	90	2,360	10	235,225

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

Pool 19 Mississippi River Date: April 7, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Keokuk-Nauvoo	43,745	1,055	2,635	0	2,635	265	1,055	265	0	51,655
Arthur Refuge	1,000	0	0	0	0	0	0	10	0	1,010
Nauvoo-Ft. Mad.	45,650	550	2,750	0	4,400	275	550	275	0	54,450
Ft.Madison-Dallas	27,330	0	500	0	605	50	160	20	0	28,665
Dallas-Burlington	7,500	0	0	0	200	0	0	0	0	7,700
Turkey Slough	1,810	0	0	0	220	0	0	0	0	2,030
Burling. - 18 Dam	1,510	0	0	0	0	0	0	0	0	1,510
Total	128,545	1,605	5,885	0	8,060	590	1,765	570	0	147,020

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

Pool 19 Mississippi River Date: April 9, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Keokuk-Nauvoo	37,215	205	410	0	2,045	0	820	205	0	40,900
Arthur Refuge	215	0	0	0	50	0	0	0	0	265
Nauvoo-Ft. Mad.	25,560	355	355	0	1,520	0	420	455	0	28,665
Ft.Madison-Dallas	19,800	275	275	0	1,400	0	325	275	0	22,350
Dallas-Burlington	2,630	0	0	0	10	0	0	0	0	2,640
Turkey Slough	200	0	0	0	0	0	10	0	0	210
Burling. - 18 Dam	3,500	0	0	0	0	0	0	0	0	3,500
Total	89,120	835	1,040	0	5,025	0	1,575	935	0	98,530

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

Pool 19 Mississippi River Date: April 15, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Keokuk-Nauvoo	1,705	0	0	0	135	0	30	0	0	1,870
Arthur Refuge	0	0	0	0	0	0	0	0	0	0
Nauvoo-Ft. Mad.	1,935	0	10	0	430	0	90	0	0	2,465
Ft.Madison-Dallas	620	0	0	0	60	0	0	0	0	680
Dallas-Burlington	1,360	0	0	0	0	0	10	0	0	1,370
Turkey Slough	400	0	0	0	0	0	0	0	0	400
Burling. - 18 Dam	210	0	0	0	0	0	0	0	0	210
Total	6,230	0	10	0	625	0	130	0	0	6,995

ILLINOIS NATURAL HISTORY SURVEY WATERFOWL AERIAL INVENTORY DATA

Pool 19 Mississippi River Date: April 21, 2014 Observer: Aaron Yetter

LOCATION	LESC	RNDU	CANV	REDH	RUDU	COGO	BUFF	COME	HOME	TOTAL DUCKS
Keokuk-Nauvoo	135	0	5	0	560	0	20	0	0	720
Arthur Refuge	0	0	0	0	0	0	0	0	0	0
Nauvoo-Ft. Mad.	165	10	0	0	260	0	0	0	0	435
Ft.Madison-Dallas	120	0	0	0	40	0	0	0	0	160
Dallas-Burlington	5	0	0	0	0	0	0	0	0	5
Turkey Slough	0	0	0	0	0	0	0	0	0	0
Burling. - 18 Dam	5	0	0	0	0	0	0	0	0	5
Total	430	10	5	0	860	0	20	0	0	1,325